Vol. 4, No. 2

MicroWINGS Magazine

OFFICIAL MAGAZINE OF THE INTERNATIONAL ASSOCIATION FOR AEROSPACE SIMULATIONS

Aerosoft's ACP & FLY-IT's GA1

Designing Your Own Scenery

Review of Jeppesen's FS-200

Add A GPS To Flight Simulator

The Virtual Skunk Workshop

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from the editor

For many years, since day one really, the Microsoft Flight Simulator has been the only VFR simulator worth considering. But in 1996 this appears to no longer hold true. Just released is a new product from Laminar Research called X-Plane and due out in November is a new product from Sierra called Pro-Pilot. You can see screen shots of these sims in the Sneak Peeks section. If that is not enough for 1996, Microsoft is also expected to roll out their Win95 version of Flight Simulator and two other companies are rumored to be readying Flight Simulator challengers - but we would rather hold off on naming those until the rumors are found to be facts. That makes five new sims we may be seeing in 1996!

With this theme of "new" stuff, I would like to be sure you visit the Flight School column where you will meet your new flight instructor - Robert Pursur. We also have a resurrected column, Designer's Den, that will show you the in's and out's of designing scenery for FS5 in the issues to come.

The Expanding ATC Features series in this issue, does not really expand ATC, but rather adds a fully operation GPS instrument to your flight sim. No longer will you need to use NavAids or be relegated to only making IFR approaches at airports that have an ILS system. In testing the MWGPS adventure, we were able to land at Meigs Field (which has no ILS), with a cloud base just 200 feet above the ground and visibility set to just 1/4 mile. The GPS brought us right in for a picture perfect landing, right on the numbers!

If you want to learn more about adventure programming, then let me tell you a little 'secret' to easily get to the code. Keep in mind that the ATC code is copyrighted, and the following is provided only so that you can learn more about FSFS adventure programming. If you will edit the properties of the icon you use to launch ATC Workshop, and supply www.microwings.com in the parameter field, then program will always leave the .TXT file in your directory which contains all the code for the ATC adventure you just uploaded. The filename will be the same as the flight plan name. Ex. DFWORD.FSP (the flight plan file) will have the adventure code (after uploading) stored in DFWORD.TXT. This is a simple text file, readable by any text editor or word processor.

I am proud to announce that the MicroWINGS commercial member family has grown by two more companies. **Nomissoft** is the company that developed the invaluable ATP Utilities for subLOGIC's ATP airliner simulator. They are more recently well known for their add-on to ATP called 3D-AGS (aka ATP Companion). **Aviation Teachware Technologies** is the North American publisher for Initiative Computing's renown ELITE line of IFR simulators. They also provide the full line of avionics, throttle quadrants, and flight controls from Precision Flight Controls and NT Systems. *[MW✈]*

NOTAM'S

(Notice to Airmen)
News Bits From Around The World

MicroWINGS Adds New Features To Web Site

The MicroWINGS web site has added several new features since our last issue. First, our message board has been re-created to allow threading of message topics/replies, easy posting of follow-up messages, and hotlinks for reading related messages within a message topic thread . The message board is meant to be a community gathering point where you, the fellow flight sim enthusiast, can post tips, tricks, ask questions, respond to messages from others that you may know the answer to or perhaps have experienced the same situation their message may describe, etc. The second major new feature is our internal web site search engine. Our site has become quite large, and finding which pages cover the topics you are interested in could be time consuming. To alleviate this, we now have an option you can click on where you can type in one or more keywords and let our web site tell you which pages contain those keywords. The pages are listed for you with hotlinks already setup so you can jump directly to those pages. The MicroWINGS Store section of the web site is also now open allowing for easy ordering of renewals, back issues, DFW scenery, new memberships, etc. [http://www.microwings.com]

Apollo And AETI Release Europe II

AETI in North America, and Apollo Software in Europe, will be distributing the new Europe II from Alting Software. Alting authored the first Europe I which covered Austria, Germany, Switzerland, and the Netherlands. Europe II will cover in their entirety; France, Luxembourg, Belgium, and the island of Corsica.

Thrustmaster Makes Sticks For NASA Shuttle

Thrustmaster has completed the manufacturing of controllers used for the NASA Space Shuttle program. The Rotational Hand Controller reproductions will be used in ground training and onboard shuttle training simulators which allow astronauts to practice shuttle landings while still in orbit.

New SIM Forum On CompuServe

A new forum on CompuServe has opened. Now, you have two forums on CompuServe where you can get information, files, exchange messages, and such. The new forum is titled SIMGAMES and features many sections on general aviation sims including one dedicated to ATP (sysop'd by the ATP utility master himself, Simon Hradecky).

New WEB Sites

New web sites: Apollo Software launches Internet web site, located at http://www.apollosoftware.com. Flight Sim Central has opened their web site for business, located at http://www.fscentral.com.

ATP Conference Set For June In Austria

An ATP Conference is set to take place in Salzburg, Austria, June 7th through June 9th. Nomissoft will be the host for this exciting ATP specific conference. Conference fee is $300. Contact Nomissoft via fax for more information at +43-662-87-76-894.

New X-Plane Sim

Laminar Research has released their new sim titled "X-Plane". For more information, see the preview on the MicroWINGS web site and/or call Laminar at 803-738-0910, or JetStream Catalog at 503-693-3522.

CH Products Starts Shipping Their New Pro Throttle

CH Products has started shipping their Pro Throttle controller. The Pro Throttle features 20 programmable functions, 4 four-way switches, and 4 push-buttons. A unique forward and backward slide motion provides your throttle control. Analog and Digital modes are included. The Pro Throttle works with any standard joystick and rudder pedals. Both individual keys and macros can be coded. *[MW✈]*

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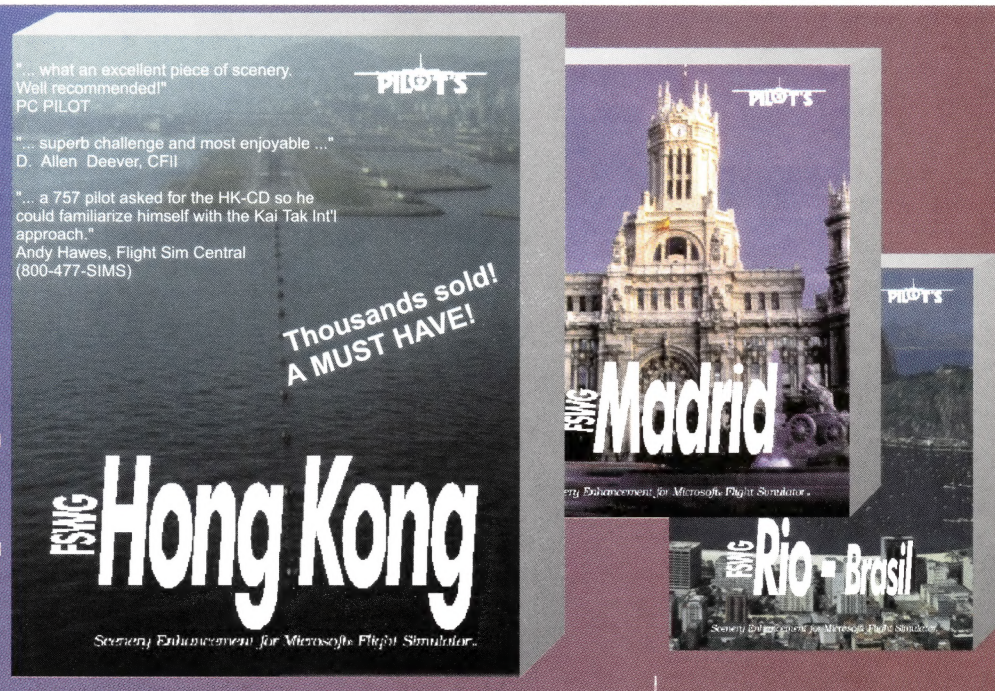
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About the cover:

Set to come out before year's end, are several new general aviation/airliner based flight sims. Picture here and in the Sneak Peeks section, are screen shots from Sierra's upcoming ProPilot flight sim. The cover shows the Cessna CitationJet panel flying south, away from San Francisco. The product looks very promising, especially for screen shots from such an early alpha version to be so spectacular!

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See masthead on page 3 for further information regarding MicroWINGS Magazine.

MicroWINGS Drawing Winners!

The Mar/Apr Drawing Winners Are:

John Gould
of Ridgefiled, CT
John has *PILOT's Hong Kong scenery*
on its way to him.
Congratulations!

Bill McCracken
of Marlton, NJ
Bill has BAO's
Flight Simulator Flight Shop CD
on its way to him.
Congratulations!

Review of...

Aerosoft/AETI ACP and FLY-IT GA1

The eyes may be fooled. The imagination is running at full steam. The real aviation maps are out. The Flight Shop addon is guiding us with digitized, interactive voice ATC. We have dual clipboards strapped to our knees; one with the Instrument Approach Plate, the other with the Terminal Chart. The call comes in from ATC...

"Cessna 414, tune in
Approach on 118.55.
Good Day"

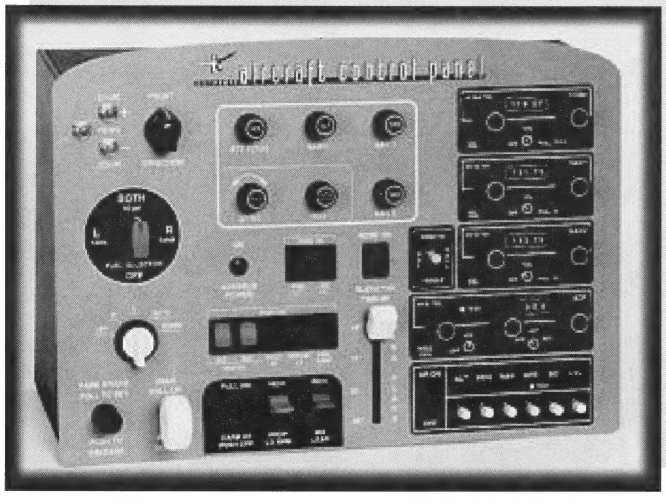
Poof! The reality (virtual) has just been smashed as I realize that I am having to use a mouse (which you would never find in a cockpit!) to click on a simulated radio image to change frequencies.

Voila! The answer to continuing the virtual realism can be found by using an aircraft control panel. Two recent entries into the market are from Aerosoft (distributed in North America by AETI) and from Fly-It Simulators. What is unique about these two panels is that they break the $1,000 price barrier for panels with similar features. Let me introduce you to each of these panels.

Aerosoft/AETI ACP

The Aircraft Control Panel (ACP) is a one piece solution to flying computer based sims without the need of a keyboard and/or mouse. Measuring approximately 13" wide by 10" tall and just 6" deep, the ACP is without a doubt, the most compact panel you can buy. Just about anything you need to accomplish during a flight is just a hand's reach away.

Okay, so it's compact, great for my already overcrowded desk, but what will I have to sacrifice in blood, sweat, and tears to get this dream of a panel installed? I have heard the installation horrors for just about any hardware installation - you know... where you have to pry open the computer, faint at the sight of all those wires and electronics, and then be severely admonished and penalized for not knowing my DMA channels, IRQ's, addresses, and Interrupts! Well, if you are not a geek, then this panel was almost custom tailored for you! Installation is as easy as plugging your keyboard into the ACP, and then the ACP into where your keyboard normally plugs in. That's it! No opening the PC, no jumpers, not even any software!



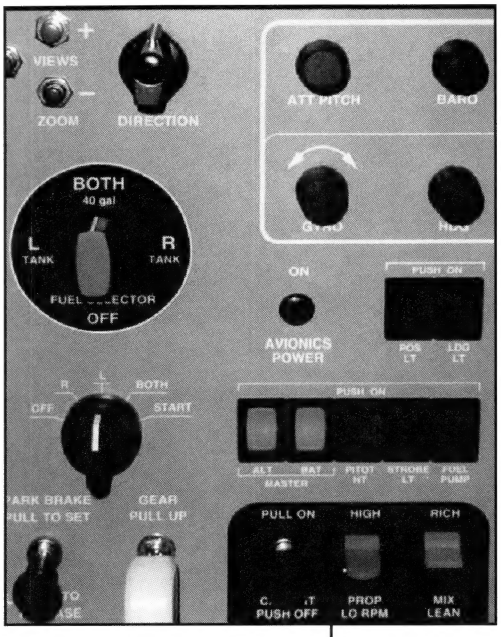
Alright! That was easy enough. Okay, so now what features do I get for my hard-earned money? We'll simply start out at the top-left of the panel and describe each feature.

View Control: A knob allows you to select any of 8 different view directions. Push buttons allow you to select the view mode (cockpit, spot, or tower), and zoom (in or out). Further below you'll find a fuel tank selector where you can choose left, both, right, or off.

Next is your magneto/starter switch. Here you can move the switch left or right to sequentially select off, right, left, both, or start. Each turn to the right or left advances or retards the magneto options. At the bottom left of the ACP is a button to set or release the parking brakes. This button is very nice in that it stays pulled out while the brakes are set and has a solid feel click as you unlock the brakes by pushing it in. To the right is a very realistic gear knob, with realistic pull out and up/down operation for solid indication of which way the switch is situated and to prevent accidental activation of the gear.

Back up to the top, in the center, you'll find six knobs for setting various items. The knobs all work by simply turning left to do one feature, and turning right to do another. How much you turn the knob does not affect the outcome. Although the knobs are labeled with cockpit style labels, the knobs do not necessarily perform their labeled function. I suppose this is done to enhance the virtual realism. For example, it is more realistic to see a knob labeled ATT PITCH rather than it's real function of switching between split and full-screen view or recalibrating the joystick port. If you are running an FSFS ATC adventure, then ATT PITCH provides the "key the mike" and "request weather report" commands. The remaining knobs do the following: OBS/NAV1 and OBS/NAV2 set the respective OBS heading, GYRO calibrates the compass, BARO calibrates the altimeter, and HDG toggles between DME distance and DME speed/knots to the station (turning left toggles for NAV1, turning right toggles for NAV2).

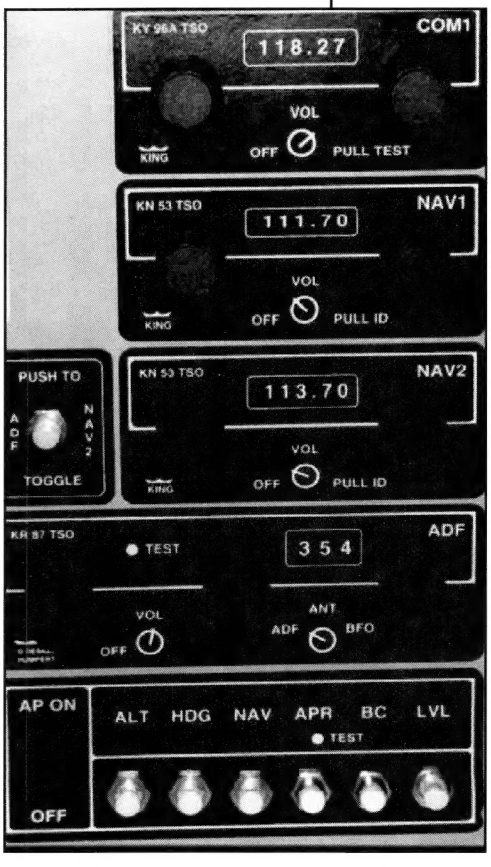
In the center of the panel, you will find a switch to give the avionics (really the ACP) electrical power. This switch is also used to toggle the ACP between FS5 mode and either ATP or IFT-Pro mode (depending on the model you



purchase). Next to it, are a pair of switches for your running lights and landing lights. And to the right of these, a switch to adjust your elevator trim up or down. Each press up gives you nose down trim, while each press down gives you nose up trim.

The next row of switches control your master alternator and battery (both need to be on for the ACP to function). Then you have switches for Pitot heat (which really provides the "repeat" command in FSFS ATC adventures), Strobe lights, and Fuel pump. The Fuel pump in reality will allow you to cycle between panels (such as in the Learjet to cycle between the radio and the engine gauge stacks).

The next row features a switch similar in operation to the Parking Brakes, but is used to turn on/off the Carb Heat. Next to it are switches to adjust your Prop and Mixture controls up or down. As with the Elevator Trim switch, each press up sets the prop for higher RPM's or the mixture to be Richer, respectively. Each press down sets the prop for lower rpm's or the mixture to be Leaner, respectively. To the right of these is the four-position Flaps lever. This lever has a very nice click and feel for where each setting is at so you know how far up/down to move the lever.



Back to the top and now to the right side, you will find your radio stack. Each radio functions the same way. The left side knob adjusts the whole number digits, while the right side knob adjusts the decimal digits. The feel of these radio knobs is very smooth. Slight clicks let you 'feel' each digit change without requiring very much turning effort. The top radio is for the COM, while the next two are for the NAV1 and NAV2. The radios themselves are simply decals/placards to give the impression of a radio. The digits shown, therefore, do not change. They only change on the flight sim (where they need to!) To the left of the NAV2 radio, is a small push-button to allow you to toggle between ADF and the NAV2 instrument. The next radio is the ADF tuner. It has three knobs for each of the three ADF radio digits.

The last item on the ACP is the Auto-Pilot control center. Here you have a master switch to turn the Auto-Pilot on/off. The next six buttons activate the following, respective, Auto-Pilot features: Altitude hold, Heading hold, Nav hold, Approach hold, Back Course hold, and Wing Leveler.

The ACP was designed to work with a yoke or stick that already has throttle options on it. Instead of duplicating functionality, the ACP gives you only things that you don't already have.

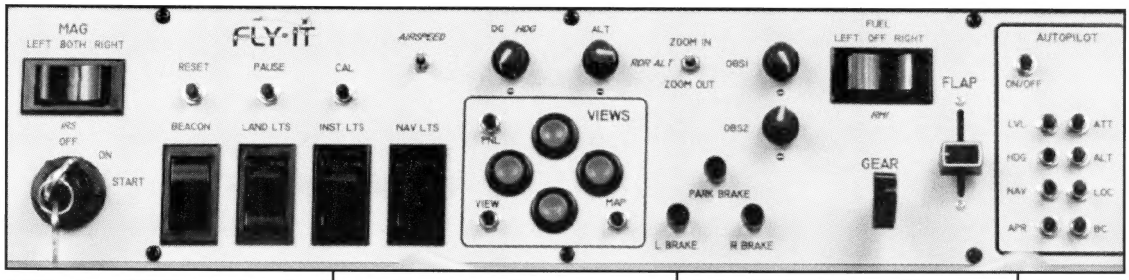
Areas for improvement: I would like to see future versions allow you to set your Transponder and additional auto-pilot options. I would also like to see the Magneto switch be made into a true, five-position switch, instead of the two-position switch in the model tested. A convenient way to reset the panel when already in FS5 would also be nice. If you forget to set a switch, it may end up being reversed in functionality.

All in all, this is a feature packed panel, taking up such a small footprint (as well as being very lightweight), that any location where you have your PC setup, should be able to accommodate the ACP. Need some room? No problem, with about 30 seconds of effort, the ACP can be disconnected and sitting up on a shelf - and you would not even have to reboot your PC! A bonus for laptop users, is that this may be the only panel in existence that you can use with a laptop (provided your laptop has an external keyboard interface - most do). So the next time you take your laptop in the air, purchase the seat next to you, drop both drink trays, and setup your laptop and ACP together to give you a virtual aircraft within an aircraft! Either way, the ACP gets a thumbs up review.

FLY-IT GA1

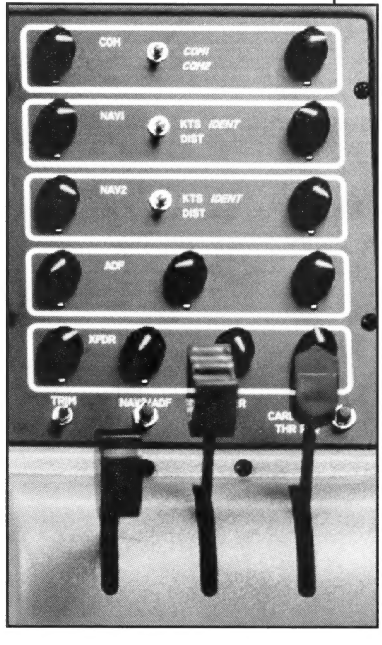
This panel is impressive right out of the box. Even without Flight Simulator loaded, you feel like your closer to being in a cockpit than ever before (unless of course you are a real pilot). When placed in front of you, the radio stack is up and to your right (like in real aircraft) and you also have a three lever throttle quadrant for Throttle, Prop, and Mixture - complete with a knob for tension adjustment!

Now if space is a problem,



you'll have to sacrifice some how. This panel is meant to be placed squarely in front of you with the monitor sitting on top of it. This means that you will not want to be moving it out of the way, very often. However, if your desk is deep enough (the unit takes up about 24") and you can still plant your keyboard in front of it, then there would be no need to store it when not being used. Just swap your stick or yoke with the keyboard. The unit measures about 27" in width and about 5" tall for the main panel, and 12" tall for the Radio Stack.

Installation is a bit involved, yet not complicated. The unit ships with a circuit board called the EPIC controller card. This unit, from R&R Electronics (see Commercial Member Directory near the back of the magazine), allows your PC to accept inputs from more than just a keyboard, mouse, or yoke. A real gem when purchasing the GA1, since you could conceivable add-on lights, buttons, etc. to what is already available on the GA1. You could also use the GA1 for your desktop and also have a homebuilt cockpit, without having to buy an additional EPIC board. Just a simple cable change and the EPIC is ready.



Installing the EPIC is easy. Just find an empty 16 bit ISA slot in your PC. You do, however, have to disable any joystick ports that may already be in your PC - usually on your sound card. The enclosed installation manual describes how to do this (a simple jumper change) for the more popular sound cards.

With the case closed back up, a few cable connections are needed. One to connect the GA1 to the EPIC. Another to connect the keyboard to the EPIC and to the keyboard port (via the use of an included keyboard 'Y' cable). The last connection is your yoke/pedals to the GA1.

To provide all the capabilities that the GA1 offers, a little software is needed. Running the installation diskette sets your PC up with all that is needed. A nice thing about the EPIC is that if you do not care for the function currently set for a button, knob, etc., you can edit the script file (a text file) and change what the item does when pressed. For more information on programming the EPIC and example code, see V3N1 of MicroWINGS Magazine.

You are now ready to go, and I mean go! A real key/switch turns your piston engine on. The Magnetos selector switch allows you to select left/right/or both. If you are using ATP, the switch will cycle left/right IRS. Switches for Strobe, Landing, Instrument, and Running Lights are a press away. View controls and buttons to switch panels, map view, and cockpit/spot/tower view are conveniently located together.

Differential braking is available on the panel as most simmers do not have pedals, or capable pedals. Or so we thought! The GA1, when used with the CH Pro Pedals, does indeed detect the differential brake action of the Pro Pedals and supplies that information to Flight Sim! A very nice feature to have, especially when taxing around in tight quarters.

Additional buttons and knobs control Fuel Tank selection, OBS1/2 setting, Zoom, Altimeter and Heading calibration (also controls the heading bug in ATP), and a full auto-pilot selection including Master On/Off, Wing Leveler, Attitude hold, Heading hold, Altitude hold, Nav hold, Localizer hold, Approach hold, and Back Course hold. A gear switch with realistic Pull-Up/Pull-Down operation and a parking brake round out the more useful main panel features.

An Airspeed switch allows you to set the airspeed bug in ATP, or, if you are using FS5, switches the key switch to work with jet engines and the Carb Heat to work as a Thrust Reverser switch.

The Flaps handle works realistically, but lacks the clicks to feel what setting you're at. A call to Fly-It revealed that this is, in a way, a feature - as it allows the Flaps switch to be aircraft independent. If your sim has 4 flap settings, no problem. If it has 7 flap settings, again, no problem. If they had set pre-determined stops, then the panel would not be able to fully support the features of other sims (it ships already capable of being used with Flight Sim v4, v5, v5.1, and ATP - with others to follow soon).

The Radio Stack supports COM1 / COM2(for ATP), NAV1, NAV2, ADF, and Transponder. For Com and Nav radios, two knobs are provided for each to control frequency digits and decimals. The ADF and Transponder have a separate knob for each of their respective frequency digits. The COM radio also has a switch to toggle COM1 or COM2 (a feature for ATP). The two NAV radios each have a switch to toggle the readout of DME distance or knots (speed) to the station. If you are using ATP, the switch turns IDENT on/off.

Below the Radio Stack are four switches for Trim up/down, Nav2 or ADF selection, Spoiler deployment, and Carb Heat.

The throttle quadrant features realistically molded and col-

ored, lever knobs for Throttle, Prop Angle, and Fuel Mixture. To the right is a knob that allows you to adjust the tension on the throttle quadrant to suit your personal preference.

The panel's finishing touches are the three buttons that allow you to reset the sim, pause the sim, and calibrate the joysticks. The pause button has a special feature - if you keep it pressed while flipping other switches, they will not send the respective keystrokes to the sim. This is a nice feature should you accidentally start the sim with the switches in the wrong position or some how get them out of sync with what the sim's panel is showing.

What about working with Flight Shop's ATC? Not a problem if you use a CH Virtual Pilot (VP) or Virtual Pilot Pro (VPPro). The regular VP is re-programmed so that the left button "keys the mike" and the right button requests a repeat. On the VPPro, the left three buttons key the mike, request a radar check, and request a weather report - respectively. The right three buttons request a missed approach, IFR/VFR Toggle, and requests a repeat.

If you don't have a VP/VPPro, switching the COM1/COM2 switch to COM2 will change the Auto-Pilot stack to instead handle all of FSFS ATC commands that the VPPro handles, with the addition of the FSFS FPAP (Flight Plan Auto Pilot) on/off.

Areas for improvement: I would like to see future versions allow you to use the Throttle Quadrant more effectively, such as using it for precise reverse thrust levels, control independent engines on jets (up to three since there are three levers), etc. This should be fairly easy for Fly-It to add with just a software change in the EPIC scripts. I would also like to see the Magneto switch be made into a true, five-position switch, instead of the three-position switch in the model tested.

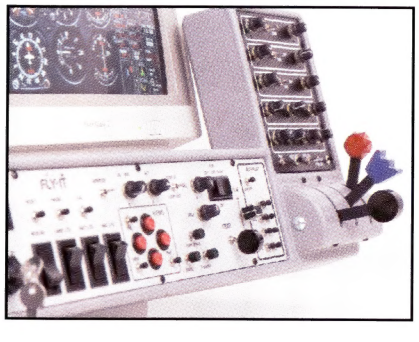
If space is not a problem, or you can compromise somehow, then the GA1 is a great buy. Well thought-out features, realistic Radio Stack layout, a realistic Throttle Quadrant, and the user expandable/customizable capabilities of the included EPIC card make the GA1 a real bargain in a true cost/performance sense.

Summary

If you are tight on space and/or are very squeamish at the thought of having to open up your PC, then by all means go with the ACP. Ease of use/installation, solid quality, feature rich, and compact are the highlights of this product.

If space is not a problem and you are comfortable with installing a card in your PC, then go with the GA1 and enjoy the added features provided such as the Throttle Quadrant and the capabilities of the EPIC card. Dollar for dollar, the GA1 brings more realism to the desktop cockpit than most products currently on the market.

In a nutshell, you just can't go wrong with either the ACP or the GA1. Both are fantastic panels for the price range they are in, delivering solid flight simulation performance. Contact information for both companies is available in the Commercial Member Directory near the back of the magazine and also on our web site. *[MW✈]*



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CROSS WINDS

with Charles Gulick

CompuServe's Flight Simulator Forum (GO FSFORUM) has long been the online "club" of FS fanatics. And it has spawned, via some of its very talented members, dozens of highly creative Flight Simulator add-ons, particularly in the areas of aircraft and scenery.

For instance, even before there was a Flight Simulator Flight Shop ("FSFS," which lets you design your own aircraft), there were utilities to let you modify the planes that come with Flight Simulator. The first one that comes to my mind is AIRMOD, by Chuck Dome, which has gone through several generations. I used it to repaint the Cessna and the Sopwith Camel, and then later to change the engine power and flight characteristics of both more to my liking (more about Chuck's work later).

Even the exterior appearance of, say, the Cessna could be modified considerably, as Wayne Russell proved by putting a pilot—visible with the spot view—in the left seat (see below).

And Kenneth Kerr came up with more attractive and more realistic instrument panels, which he began marketing via CompuServe's SWREG, a shareware registration forum where it's easy to register products you try and like and have them charged to your regular CIS account. Ken was so successful that I believe he quit his day job to devote full time to his VIP (Visually Incredible Panels) business.

Most incredible of all were the flock of scenery designers, who managed to "reverse engineer" or otherwise interpret Flight Simulator's scenery methods and create airports and landscapes on their own. A pioneer of this sort was Juan Cabeza, whose scenery of the Balearic Islands set the highest of standards for the many who followed him. And following the designers were a few programming geniuses, predominantly Europeans, who actually developed tools for *others* to use to create scenery, thus adding greatly to the body of user-developed scenery worldwide. An early talent of this kind was Manfred Moldenhauer, a sort of "guru" of scenery design to whom most designers (and designer-creators) pay rightful homage. His scenery—and his powerful scenery assembler, SCASM—pushed out the frontiers of scenery design for FS5. Another major player is Maurice Gavioli. And I hope I haven't left out any other scenery innovators.

Strip Search

Personally, my primary interest in scenery was to create some runways, in out-of-the-way places, where takeoffs and/or landings could provide some unusual fun and/or challenge.

And I wanted first—for old times' sake—to create one runway in particular.

With much help from "tutorials," especially Daniel Waskie's "Beginner's Guide to Airport," (Airport being a design program by another heavy-hitter, Pascal Meziat, and Daniel Waskie being a scenery designer with much talent and a great sense of humor), I was able to add a runway to Flight Simulator—a runway that was once in the real world and, sadly for me, is no more—Runway 09/27 at what was Totowa-Wayne Airport in New Jersey.

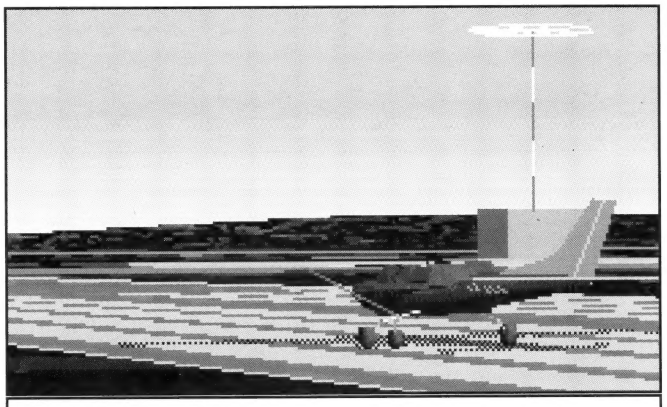

Figure CW.1 - Wayne Russell's modified 182 — pilot and all — ready at Totowa-Wayne's (New Jersey) Runway 27 in the early 1950s. Note the NDB structure, it and the runway itself products of Pascal Meziat's Airport program for Flight Simulator.

Readers of my books will recognize how nostalgic this was and is for me. I learned to fly at Totowa-Wayne, but it is no more. Even so, now I *can* take off and land there, thanks to the virtual world of FS. I was even able to put an NDB there, so I can navigate to TTW from anywhere in the New York area (see Figure CW.1).

Easy Does It

Recently a new phenomenon burst on the scenery design scene—a program called Runway, created by the aforementioned Chuck Dome. Brilliantly simple, Chuck's pro-

gram lets you place—not only runways but some buildings, too, wherever in the world you like. Besides hard runways you can even select dirt or grass. This ingenious program permits virtually any FS'er to at least get a taste of scenery design.

If you are a member of CompuServe you might want to download Chuck's file, RUN116.ZIP, from FSFORUM Library 5. It unzips to two files, RUNWAY.EXE and RUNWAY.DOC. Copy the former to the FLTSIM/SCENERY directory, since it uses BGL files and they're all there.

When you run the program you see a single screen of large push-buttons. If you have (or get) RUNWAY.EXE, create your first runway as follows (the Tab button moves you to the Degrees box and all subsequent boxes in the proper order):

Carefully (backspacing and/or deleting can foul up your work), opposite LATITUDE in the pertinent boxes, enter 41 degrees, 52 minutes, and 34.17 seconds. For LONGITUDE specify 87 degrees, 37 minutes and 14.63 seconds, Tabbing after each. Just so you'll know, these values represent the center or midpoint of the runway you're creating.

Under Heading, enter 320, and under Altitude 594. The length of the runway we're constructing is only 2,200 feet (though RUNWAY allows strips up to 6 miles long!), so enter 2200 under Length, and below Width enter 60. Then under File Name type MIDCITY.

The next tab takes you to the SURFACE options. For our purposes, click on Concrete (you'll hear a beep). Then tab to Runway Numbering, click on it, enter 32 and select None. Tab to PRODUCE and click on it. Under Create a Non-Directional Beacon? click on Skip, and under Create a Building tab to NO and click. You are finished and instantly returned to DOS.

Still in the Scenery directory, type DIR MIDCITY.BGL and you'll see that the file is beautifully small—only 280 bytes.

Seeing is Believing

Now boot Flight Simulator, and use Alt-W to access Airports...Select MIDCITY, then click on Runway 32 and OK. You'll see approximately what's shown in Figure CW.2. If you're not precisely aligned with the runway centerline, engage your map and Slew and line up. Then slew backward until you see the runway numbers. At that point, save the situation using the title MIDCHI, or whatever you like, because as you may have recognized the skyline out there is that of Chicago. Zoom out on your map and you'll see your runway diagonally intersects Grant Park.

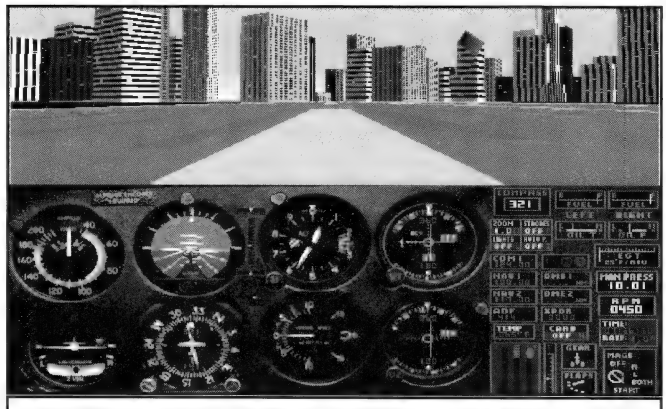

Figure CW.2 - Runway 14/32 in midtown Chicago, constructed on Grant Park using Chuck Dome's RUNWAY.EXE. For the optimum challenges, take off on 32 but land on 14.

So now you're ready to fly! Can you make a safe takeoff through that forest of buildings? Sure. And once you're clear of the city proper, do a 180 and come back and land on Runway 14. That, perhaps, is a little tougher.

About the author - Charles Gulick is the author of six books on the various versions of Flight Simulator, the "Fly" series of situation disks, and the recent "Vectors" adventure set for use with Flight Shop. Charlie can be reached on CompuServe at ID [71241, 321]. [MW✈]

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Hey mister, I'm talking to you. We're not going to make it, go around. Do it now!
BOB'S FLIGHT SIMULATORS
Geesh! Some instructors really get into this simulator thing, don't they?

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Expanding Flight Shop's ATC Features

The following is an additional custom module you can use to enhance the ATC Workshop generated adventures of Flight Shop. They can also be used as 'real' working examples of how to write adventures with the Flight Shop's APL programming language. Other modules have been covered in the prior two issues of MW Magazine.

Why Don't The Modules Work?

As mentioned before, many of the modules published to date and the one described in this issue, require the patched version of Flight Shop. The patch is free and can be downloaded from many on-line areas including our web page. Look for a file called FSFS501.EXE.

General Coding Guidelines

Coding in APL is very similar to coding in a generic flavor of the tried and true BASIC language. I won't go into teaching BASIC here, but I will point out in each of the routines to follow, any special commands or coding methods used. Hopefully, the samples shown here will awaken you to the possibilities provided by Flight Shop's ATC and will provide enough coding examples to get you going on your own ATC subroutines or full-blown, stand-alone adventures of similar of unique functionality. *The following code is copyright and may be reproduced for your own use, but may* ***not*** *be distributed by anyone other than the author, i.e., me.* Within a few weeks, I will be posting these subroutines onto the following networks - The MicroWINGS Web Page, CompuServe's FSFORUM, America On-line's FSRC, and the Microsoft Network's Flight Sim forum.

Global Positioning System Module

GPS, GPS, what is all the buzz about GPS? Well, for one thing, GPS allows you to fly anywhere in the world without having to have an on-the-ground navigation facility like a VOR or NDB, not even and ILS! Another thing is that it allows you to make instrument flight rule (IFR) condition landings, even at an airport that is not equipped for such. In my testing of this module, I was able to land at Meigs Field (which has no ILS equipment), in overcast skies, ceiling of just 200 feet above ground level (AGL), and visibility set to just 1/4 mile!

This module does not add any ATC features, but rather a new "instrument" that you can use in ATC or stand-alone flights. The module, when turned "on" with the press of Control-G, displays a one line text bar above your panel with a readout virtually mimicking the one-line readouts of real, panel mounted, general aviation GPS units. Figure ATC.3, 4, and 5 are pictures of the readouts as I approach and land at Meigs Field, Chicago, Illinois.

The GPS is set while you are in your cockpit, on the ground or while flying. All you do is enter the lat/lon coordinates of where you are trying to fly to and the heading that you are trying to line up with (in the case of landing on a runway). The lat/lon information needs to be in Deg.Fraction format. Flight Shop's ATC Workshop has a convenient utility to convert DegMinSec into Deg.Fraction. You enter this information as follows (also refer to Figures

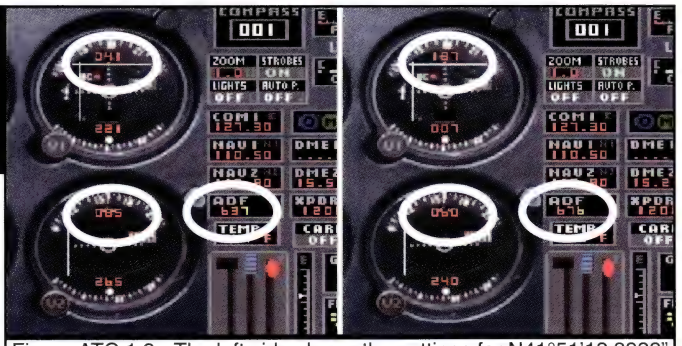


Figure ATC.1,2 - The left side shows the settings for N41°51'13.3932" (41.8537). The right side shows the settings for W87°36'27.2472" (87.6076). Note the entry of 187 (+100°) to indicate negative longitude. The conversion from DegMinSec to Deg.Fraction is easily accomplished with the utility included in Flight Shop's ATC Workshop.

Figure ATC.3 - Here we can see that we are 3.8 miles from touchdown zone (TDZ), putting us about 3 minutes away, we are 0.2° lower than a standard 3° glideslope, we are 8.9° off the localizer and need to head more to the left, and our bearing to the TDZ is 350°.

Figure ATC.4 - Alright! This GPS stuff is working! Barely visible now are the runway lights, we just slightly below glideslope so we'll add a touch of power, we are 115' off the water, and less than a 1/2 mile from the touchdown zone.

Figure ATC.5 - A slight adjustment as we see that the GPS has brought us down right to the numbers on the runway. A precision landing at a facility without ILS capabilities. ***Now,*** I understand why GPS is so hot in the aviation industry!

```
MWGPS:
    ;Copyright (c) 1996 by Robert M. MacKay
    ;All rights reserved
    ;MicroWINGS email: fltsim@microwings.com
    ;MicroWINGS web  : http://www.microwings.com

NORTH_LATITUDE
EAST_LONGITUDE

    DECLARE GPSLat
    DECLARE GPSLon
    DECLARE GPSTemp
    DECLARE GPSOnOff
    DECLARE GPSAlt
    DECLARE GPSBrg
    DECLARE GPSDist
    DECLARE GPSGS
    DECLARE GPSLoc
    DECLARE GPSRwyHdg
    DECLARE GPSETEHrs
    DECLARE GPSETEMin

    ADV_KEYS ADD, KV(CTRL "1")    ;Ctrl-1  Set Lat Coordinates
    ADV_KEYS ADD, KV(CTRL "2")    ;Ctrl-2  Set Lon Coordinates
    ADV_KEYS ADD, KV(CTRL "3")    ;Ctrl-3  Set Rwy Heading (Magnetic)
    ADV_KEYS ADD, KV(CTRL "g")    ;Ctrl-g  Toggle On/Off

    ;DEG = OBI1 (+100 for negative)
    ;FRAC = .xxyy (xx=OBI2, yy=Last two digits of ADF)
    ;RWY = OBI1

MWGPSLOOP:
    WAIT 0
    IF KEY=KV(CTRL "1") THEN  ;Set Lat Coordinates
        WAIT 0, KEYPRESS
        GPSLat=VOR_1_OBS+VOR_2_OBS/100+(ADF_FREQ/100-INT(ADF_FREQ/100))/100
        IF GPSLat>90 THEN
           GPSLat=(GPSLat-100)*(-1)
        ENDIF
    ENDIF
    WAIT 0
    IF KEY=KV(CTRL "2") THEN  ;Set Lon Coordinates
        WAIT 0, KEYPRESS
        GPSLon=VOR_1_OBS+VOR_2_OBS/100+(ADF_FREQ/100-INT(ADF_FREQ/100))/100
        IF GPSLon>180 THEN
           GPSLon=(GPSLon-100)*(-1)
        ENDIF
    ENDIF
    WAIT 0
    IF KEY=KV(CTRL "3") THEN  ;Set Rwy Heading
        WAIT 0, KEYPRESS
        GPSRwyHdg=VOR_1_OBS
    ENDIF
    WAIT 0
    IF KEY=KV(CTRL "g") THEN  ;Toggle GPS On/Off
        WAIT 0, KEYPRESS
        IF GPSOnOff=1 THEN
            GPSOnOff=0
            PRINT_TIME 1
            PRINT ""
            PRINT_TIME 5
        ELSE
            GPSOnOff=1
            PRINT_TIME 10
        ENDIF
    ENDIF
    IF GPSOnOff=1 THEN
        GPSAlt=MTOF((PLANE_ALT-GROUND_ALTITUDE)/10)
        IF GPSAlt>1800 THEN
            GPSAlt=0
        ELSE
            GPSAlt=GPSAlt*10
        ENDIF
        GPSBrg=RADIAL(GPSLat,GPSLon)
        GPSBrg=GPSBrg+180
        IF GPSBrg>360 THEN
            GPSBrg=GPSBrg-360
        ENDIF
        GPSDist=GROUND_DISTANCE(GPSLat,GPSLon)
        GPSGS=GLIDE_SLOPE(GPSLat,GPSLon)
        IF GPSGS>45 THEN
            GPSGS=0
        ENDIF
        GPSLoc=GPSRwyHdg-GPSBrg
        IF GPSLoc>180 THEN
           GPSLoc=GPSLoc-360
        ELSEIF GPSLoc<(-180) THEN
           GPSLoc=360+GPSLoc
        ENDIF
        GPSTemp=GPSDist/VELOCITY_INDICATED
        GPSETEHrs=INT(GPSTemp)
        GPSETEMin=(GPSTemp-INT(GPSTemp))*60
        PRECISION 1,1,1
        PRINT "Lat:",GPSLat," Lon:",GPSLon," Dist:",GPSDist," Gldslp:",GPSGS," Loclzr:",
        IF GPSLoc<0 Then
            PRINT GPSLoc*(-1),">",
        ELSE
            PRINT "<",GPSLoc,
        ENDIF
        PRECISION 2,0,0
        PRINT " Alt:",GPSAlt," Brg:",GPSBrg," ETE:",GPSETEHrs,":",GPSETEMin
    ENDIF
    GOTO MWGPSLOOP
```

ATC.1/2)...

To enter the Latitude:

1. Set the OBS1 to show the degrees. If the latitude is SOUTH (negative), then add 100 to the degrees. Example, S-37 would be 137 on the OBS1.

2. Set OBS2 to show the first two decimals.

3. Set the ADF to show the next two decimals.

So, if you were trying to enter 37.5436 degrees latitude, you would have 037 on OBS1, 054 on OBS2 and x36 on the ADF (the first digit of the ADF is ignored).

4. Press Ctrl-1 to set the latitude.

To enter the Longitude:

Follow the same directions as for latitude, press Ctrl-2 instead of Ctrl-1. If the longitude is WEST (negative), then add 100 to the degrees. Example, W-97 would be 197 on the OBS1.

To enter the Runway Heading:

1. Set OBS1 to the magnetic runway heading. Press Ctrl-3.

Your GPS is now set. Once set, you can use the OBS1/2 and ADF for their normal functions. The setting of the GPS coordinates can be done as often as you like while enroute. Perfect for using the GPS to monitor your route to each waypoint in your flight plan.

Using the GPS

The GPS display is toggled on and off with the pressing of Ctrl-G. The readout informs you of the currently entered Lat/Lon coordinates (where the GPS is taking you to), the Distance to go, the Glideslope you are currently at in degrees, the localizer deviation in degrees with an indicator of which way you need to turn to intercept, your altitude AGL, your bearing to the coordinates, and the Estimated Time Enroute remaining to reach the coordinates (given your current distance and ground speed).

The bearing indicator tells you your heading direct to the lat/lon coordinates you entered. If you are using the GPS to monitor your route to each waypoint, then this is the heading that you should be trying to maintain.

Since you need to be lined up with a runway before getting there, the bearing would not be practical. What you need is a way to get lined up with the runway and maintain that alignment. That is what the glideslope and localizer readings do for you (you need to have entered the ***magnetic*** runway heading with a Ctrl-3 first).

In general, a 3° glideslope is the common angle of approach to any runway. If the glideslope reading is larger than 3°, then you are too high and need to lose

altitude quicker - reduce power, add flaps, etc. As you near 3° add power back and try to maintain it. If the reading is less than 3°, then you are too low and need to add power until you get back up to 3°. Try to maintain a reading of 3°.

The localizer tells you how far off (in degrees) you are from being lined up with the center of the runway. A < or > symbol aides you in knowing which way you need to turn to intercept the lined-up runway heading. I usually compute my intercept heading by subtracting or adding (depending on the < or > symbol) localizer reading from the runway heading. In figure ATC.3, I need to turn to a heading of 359°-10°=349°. I'll keep that heading until the localizer reading gets close to 0. At that point, I'll turn back to the same heading as the runway and I should be lined up. Keep making small corrections as needed to keep the localizer reading as close to 0 as you can.

With the glideslope at 3° and the localizer at 0, you are headed perfectly down to the runway. Watch the distance and ETE readings to see how much further to go and how long it will take. Watch the altitude reading to see how high off the ground you are at.

Summary

The code for the GPS is designed for execution as a stand-alone adventure. To convert it to work within an ATC Workshop adventure (i.e. make it into a custom module), simply remove the last statement that says GOTO MWGPS and replace it with a RETURN statement.

There are many ways to further enhance this GPS code. You could add a way to store more coordinates so all you have to do is select the next set as you are flying. You could also expand the information line to add info such as an ^ or v indicator next to the glideslope. You could also add a checklist of sorts based on your distance from touchdown, such as Flaps 1, Flaps 2, Gear Down, Flaps 3, Carb Heat/Spoilers, Flaps 4, etc. Upon touchdown, you could let the pilot know to bring the flaps all the way back up, etc.

Before I close for this issue, let me answer again the question that many of you may ask: *"The ATC Workshop UPLOAD command only allows us to specify up to three custom modules. How can we make flights with the features of more than just three custom modules?"* Actually, this is quite easy. Just copy all these modules into one file. Then, remove the last RETURN statement from all the modules except the very last one in the file. An easy way to copy these files into one file is to use the following DOS command (example):

```
COPY tchklst.txt+lchklst.txt+grdatc.txt+moreatc.txt multi_cm.txt
<ENTER>
```

This will copy four modules into one called multi_cm.txt. Edit this file and remove all the RETURN's except the very last one.

NOTE: Some custom modules have their own subroutines within their own code. These will need additional code to make them branch over their subroutines before ending. It may be easier to keep those as separate custom modules. *[MW✈]*

The Science Of Simulations

To Zoom Or Not To Zoom?

Have you ever wondered why it is easier to land in Flight Simulator in a magnified view rather than a normal view? If you have, then read on!

Perception - It is the process of how the mind interprets the various senses. How one reacts in the real world is based on repeated exposure to one's senses. Specific reactions come from experience in the real world, such as knowing just how far to reach to grab an object. The perception of an intoxicated person can be skewed to the point where the simple task of reaching for an object maybe missed. In the intoxication case, the world is not changed but the person's perceptual ability is. However, in the case of many PC based simulations, the "world" is what has changed whereas the person has not. The person makes judgments of this changed "world" based on real world parameters. This is the reason why it can be difficult to land in normal view.

Before we look at how the Flight Simulator world is distorted, let us look at how we 'see' in the real world.

Field of View (FOV) - It is how much we can see up and down, left and right. Take, for example, looking in a window of a room. You can see the left and right walls and the floor and ceiling with ease. As you back up you see less and less of the left and right walls. Eventually, if you back up far enough, you can only see a small view into the room. The FOV of inside the room decreases as you back away from the window. When you back away from the CRT running FS, i.e., a window, the outside view does not decrease. You can still see just as much left and right as if you had your face right against the CRT. We'll talk about this some more later.

Judging Distances - In the real world, how we determine how far an object is away from us comes from a variety of different techniques such as relative size and perspective. There are many other cues to judging distance but, for the purposes of this discussion, they are not mentioned here. We can judge distance of a plane in the sky by the relative size of it. Using relative size assumes we know the true size of the object. Perspective allows one to follow a road or objects that appears to be getting smaller when we know that the size remains constant. How much smaller the road or objects are, in using the perspective, provides a cue as to how far away you are looking.

The people who design simulator software do not know what size CRT you have. Nor do they know how close you are to the CRT when running the simulation. If you get a large CRT, you won't see any more terrain than if you use a small one. If you move closer to the CRT, you do not get any more FOV of the terrain. It is obvious that the CRT is not acting like a window! Software designers choose what FOV the window will have. This is akin to forcing you to stand at a specific distance from the window of the room in the example above.

However, you are not fixed in your position to the CRT nor is the size of the window fixed. Being anywhere other than the design point of the software will give you false relative size and perspective cues.

The "window" in Flight Simulator allows you to see 60 degrees left to right of the terrain. The correct position to look through the window to see the terrain the same as the real world is 0.69 times the diagonal of your CRT. If you have a 14 inch diagonal CRT, 0.69 x 14 = 9.7 inches. You must be 9.7 inches to see the world as real providing the same perspective and relative size cues as if you were in the real world. For a 19 inch monitor, you would have to be about 13 inches from the CRT. Most of us do not sit this close to our monitors when flying. This is especially true for users of Fresnel lenses. Not only does the lens magnify the image but also makes the image out further. The same holds true, what ever the size of the magnified image is, you have to be at .69 the diagonal away to see it correctly! For lens users, this is impossible as the position would place the user on the wrong side of the lens. The only way to make the view correct is to have the software use a different FOV for the "window".

The magnification feature of Flight Simulator is nothing more than the software changing your position relative to the "window". This is done by changing the FOV of the window. Let us say that we make Flight Simulator's window so small as to only be able to see a very small object such as a distant plane. The small FOV allows you only to see the plane but now the picture on the CRT occupies the entire screen. The effect is magnification. This is because whatever window the software uses will fill your screen. In the real world, changing the size of the window to the room (from the original example) does not change the size of the objects in the room.

So how can I use the magnification to make the view correct? Selecting a 2x magnification cuts the window FOV by one half, i.e., 30 degrees. 3x would be 20 degrees, 4x would be 15 degrees and so on. The ideal position to be from the screen in 2x mode would be 1.5 times the diagonal of your CRT. This means if you have a 14 inch CRT, the ideal position is 21 inches. For 3x and 4x magnification, the ideal position to be is 2.3 times and 3 times (respectively) the diagonal of the CRT (or image in the case of Fresnel users).

Since many users of FS sit approximately 2 feet away from the CRT, the magnification value of 2x changes the ideal position from 9.7 inches to just under 2 feet (21 inches) thus providing the proper relative size and perspective cues of the terrain - allowing for easier visual landing cues.

About the author - Tom Kopke is a research physicist in the area of training simulation technology, specializing in display systems. He can be reached on CompuServe at ID [70640,3205] where he is also an assistant sysop in the FSFORUM. [MW✈]

Figure SOS.1 - Compare the middle and bottom screen shots to the photo at the top. Notice the heights of the downtown buildings compared to the photo. Wouldn't you agree that the bottom screen shot more closely resembles the real-life view shown in the photo? If you do, then you will never again land without your Zoom set to 2x. The middle screen shot is at the normal 1x, while the bottom screen shot is the exact same view at 2x. Sure, normal 1x view is nice for taking in a lot of scenery - however, it is ***very*** unrealistic and actually makes landing your aircraft ***more*** difficult as your depth cues are grossly misrepresented.

DESIGNER'S DEN

Creating Scenery For Microsoft's Flight Simulator v5.1

After many hours logged into your Pilot's log-file, there will certainly be a moment when you will want more places to fly around than just the default areas included with Flight Simulator 5. There are some add-on scenery areas in the software stores, but they are often difficult to find, cover a small area of the world, and more than likely do not cover your local area. So what can you do? Create the scenery yourself? But how can you do that? There are a couple of programs that have been authored by 3rd party (i.e. not commercial) individuals to create scenery, namely Airport, BGLGEN, and SCASM. These programs are very different, and none of them is the best. These programs have their pro's and con's. In this article, I'll go through each program and let you just what you can do and expect from them.

Airport 1.21

The latest version of Airport, version 1.21, was developed by the French club Virtual Pilots of France, for users of flight simulator v4, v5, and others. This program runs under DOS and windows. The readme-files that come with the program are very clear and easy to understand and you can start learning by modifying the examples. With this program you can easily create airports with taxiways, buildings, an such. When started, a main menu type screen appears that lets you start the different parts of the program. If you want to create new scenery, the developer's advise you to draw a plan first and after that create the needed data file with the commands that are described in the included read-me files. You save that file as a .APT file and include the 4-letter identifier for your airport (ex: EHAM for Amsterdam Airport) in the filename. Next you go to the configuration menu to put in the 4-letter identifier and Airport will look for the file you created. This method of creating a new scenery is a bit long-winded, but it works! Another method, when you don't first make a plan, is to measure the position of the runways from a certain point and add that to the .APT file. You can also create a couple of taxiways and buildings without worrying about their initial locations. When done, you go to the scene-menu where you can then move these objects to the place you want them to be. Your airport will not be as accurate as possible, but it saves a *whole* lot of time. After you have made the first version, you can add a lot more things, like buildings, objects, and even moving aircraft (dynamic scenery).

In the nav-menu you can check if the navaids are situated correctly, but most of the time that's not a very big problem, because the commands are very easy to use. When you want to use the runways and objects you have created, in Flight Simulator, you must first generate them with the appropriate function from the main screen. The program now translates the .APT files to two files. One will be named XXXX.SCA - which contains the runways and navaids (the XXXX is your airport's 4-letter identifier). The second will be named OAV-XXXX.SCA - which contains the objects and roads (again, the XXXX is your airport's 4-letter identifier). These files can be read by SCASM, which translates these files into .BGL format files, the scenery file format needed by Flight Simulator. The only thing that needs to happen now is to copy these files to the scenery-directory of your flight-simulator. This can be done with the program's B function. After this step, the files will now be useable by Flight Simulator.

A very useful feature allows you to start FS5 from within Airport. If you make a startup-situation in the area you are creating, you don't need to slew to the scenery, but you can instead see the airfield and the objects you are creating, right away. A place for improvement for this program is in the area of on-line help files. If you want to look for a command or something, you have to stop the program and look in the readme-files for the information you need. If you are a beginner, I advise you to start with modifying the examples first, otherwise you have to learn many commands all at once. Another improvement would be to enlarge the current limited number of runways, taxiways, and navaids you can create. The small limit does have it's god points: it makes the program very easy to use and you can get into creating your own airport very quickly. Although the name is Airport, the program can also be used to create cities, since there is no requirement that runways have to be in your scenery. Add some roads, houses, rivers; and before you know it - a city will have been created. If you want to add lots of navaids to your scenery, you might be better served with another program called BGLGEN.

BGLGEN

The newest version of BGLGEN, version 0.3c, created by Enno F. Borgsteede, is a totally different program than Airport. There are no screens - the only thing BGLGEN can do is compile text files to .BGL files. So, you have to make a text file (with any standard ASCII text editor) containing the commands needed to create the objects you want. You then run this text file through BGLGEN and end up with a .BGL file. An advantage of this method is that you can, using Windows, easily switch from the help-files, to the file you are editing, etc. You'll have to familiarize yourself with this way of creating scenery, but once down the learning curve, it turns out to be very easy.

One of the options provided by BGLGEN is the ability to create runways. But, you can't create taxiways (and you have to search for the runway co-ordinates yourself). So for this purpose, you would probably want to use Airport. BGLGEN's shining features are that you can easily make lots of navaids (such as VOR's, NDB's, ATIS's, etc.). Since Airport and BGLGEN both complement each other's weaknesses, both programs can easily be used together for your scenery projects. Another function of

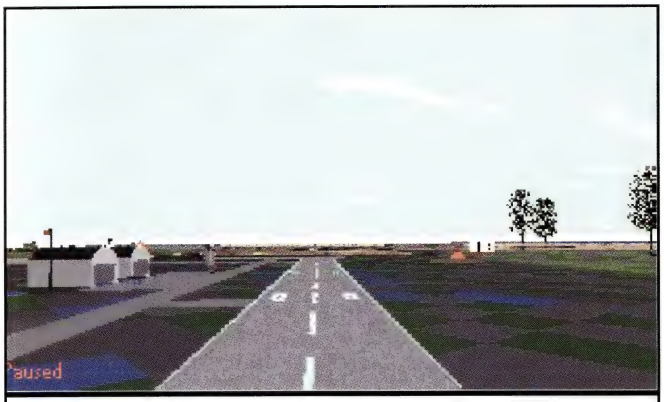


Figure DD.1 - Landing on Texel Airport - a small airport in the Netherlands that I created using Airport 1.21. Watch the wind-sock in front of the first hangar. It always points to the wind direction.

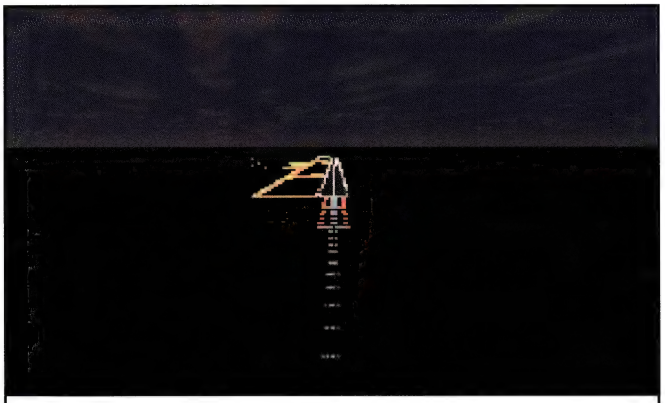


Figure DD.2 - Night-landing at Alicante Airport (in eastern Spain), showing off the use of approach lighting in scenery. The type shown here is ALSF-2. There are several types available within FS5.

BGLGEN is to create synthetic scenery. Synthetic scenery consists of large patches on the earth. You can see them if you are in an area where no other detailed scenery exists. There are six different resolutions for the patches. In the lowest resolution, it would take 265 patches to cover the equator. In, in the highest resolution the number jumps to 8,192 patches! If you go further from the equator the numbers of tiles needed stay the same, although the distance each patch covers will be smaller, thus the patches become smaller too. To calculate which tile is situated on which place on the earth, there is a program called POS that can easily calculate this for you. This program is included with BGLGEN. You can calculate which column and row a patch should cover with the command POS <section> <latitude> <longitude>. In the parameter section you have to input the resolution (1 to 6). With the results you will then know the row and column numbers to give to BGLGEN. For example, if you want a patch of land in the sea, and you found out the row and column numbers, you can put down (with some simple commands) a piece of land consisting of a bitmap. The limitation is that even in the highest resolution, the size is still several kilometers in width (so coastlines and such would be very blocky). This is no problem, if you want to fly IFR, but for VFR flying you will need to create the scenery with a program called SCASM. An advantage with BGLGEN's synthetic scenery is that you can create coastlines which are more diversified and much easier to create than what you can with SCASM.

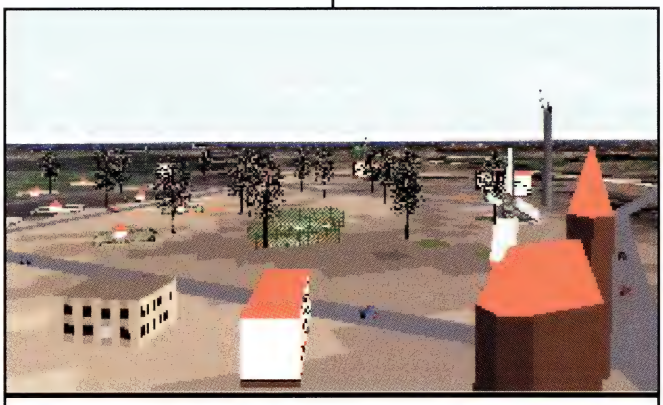


Figure DD.3 - An example of a small city. Although there are not a whole lot of different objects available in Airport v1.21, it is still possible to create small cities/towns like the one shown here.

SCASM

The authors of SCASM say that their program is an easy to use method for generating scenery for FS5, but I would not agree with this statement 100%. The readme files are very long and could be organized just a bit better. There is also no tutorial available - so if you want to learn how it works, you will have to find out about it, all yourself. SCASM works almost the same way as BGLGEN - you create a text file which you then have compiled into a .BGL file (using SCASM). But there are differences… In BGLGEN, you can't make very many mistakes, in SCASM it is very easy to make mistakes. And if you

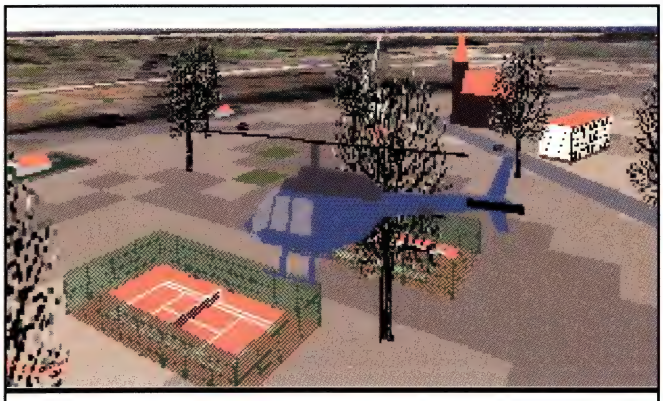


Figure DD.4 - A helicopter in flight. Also this type of scenery is possible with Airport v1.21, it is very difficult to make them really move.

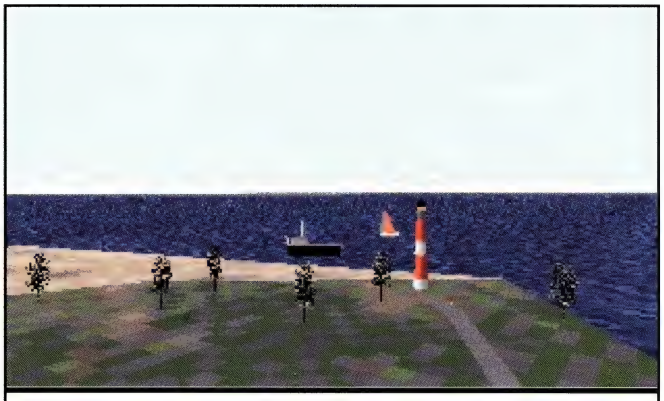


Figure DD.5 - Here you can see just how beautiful a scenery you can create (including custom objects, oblique coasts, varied ground textures, textured water, roads, etc.) with SCASM.

make a couple of mistakes, the program shows you a large listing in which every mistake is written sometimes multiple times, and only the offending line number, the line's contents, and a very vague description of what is wrong. So when you are first learning SCASM, it is very hard to get things figured out.

I recommend anyone using SCASM to start with something very easy, such as creating a single VOR. Required spaces and other formatting necessities in the commands can cause quite a lot of problems, so watch those carefully. So why put up with these areas for improvement? Simple, because the scenery design capabilities of SCASM are enormous. This is the most comprehensive program that is available and it contains all the functions that are known to be possible in FS5. One of the most important functions is the possibility to create visual scenery. You can create large coastlines, lakes, or islands by making a form with points, and if this is a closed ring, you can draw in this ring a color or a bitmap (the texture-files). But in this function there are also some limitations. For example if there is a point in the ring, FS5 sometimes shows there to be a line instead of a point. And if the ring is too large or not closed you can expect some very strange results. You can avoid this problem by creating a large number of small pieces, in stead of one large figure.

With SCASM it is also possible to generate long roads and rivers. These elements are of course necessary to make a VFR-flight possible. But the creation of railroads is a lot more difficult, because there is no function which is able to make one. And indeed I have never seen a railroad in FS5. In my opinion this is a real shame since, in many parts of the world, railroads are a very important mark on the landscape. I hope this will be possible in the next version of Flight Simulator. Everything that is possible in FS5, you can create with this program. But, the problem is that you have to find out everything yourself. As a result, you will likely never use everything it can do (because you don't know how it works). There is a file called SC_HINTS, but this file is much too small. I suggest looking at the XXXX.SCA and OAV-XXXX.SCA files generated by Airport. These files can give you hints about how to work with macro's and other functions.

Supporting Programs

There are a couple of programs that I want you to pay attention to. One of them is R8PAINT. With this program you can generate and modify bitmaps that can be used as texture file. This program is very suitable if you want to look at what bitmaps are available. If there are no good texture files for your area, you can create one yourself. The program is very easy to use but would mainly be for those who have lots of time on their hands, since there quite a lot of texture files available and creating a texture file yourself is a tedious process.

If you want to know what navaids are in a .BGL file, I recommend you try NAV13 or MAPBGL. The first one can show all navaids and airports, and with these, you can make and plot a flight plan. The second one is similar but gives very detailed information about the navaids it finds.

Sometimes it happens that two sceneries overlap each other. In that case there are two possible solutions. The first is to kill scenery in a certain area with the program AREAKILL. You should be very careful with this program, because it does what it is designed for: kill (delete) scenery. The second solution is to use the GENEXCL function of SCASM. This will suppress the scenery in a region from overlapping your own scenery files.

Creating Scenery With These Programs

When you want to create an area, you first have to create the underlying surface. Here you have the choice to use synthetic blocks or visual scenery. If you decide to use the first, you can roughly calculate the position of the blocks with the BGLGEN's POS command. My advice is to create some blocks and find out what the co-ordinates of the four corners are. After that, draw a map and look at which blocks are in the area and which are not. Then you can create these blocks with BGLGEN.

If you decide to create visual scenery, the easiest method is to trace a map, making marks for each point that you want to use to define the scenery object with. Now calculate the co-ordinates for these points in relation to a point on the map for which you know the geographical co-ordinates. Now input these numbers in SCASM, and use the scale of the map for the scale in SCASM, but don't make that number too large or small, because then the blocks of the texture will become too detailed or undetailed (a scale of 1 is nice).

Next, create the airports with the program Airport. This program is the easiest to use for this part, and you can also create taxiways, buildings, and so forth in your scenery. This make the scenery much more realistic, and it doesn't necessarily take a lot of time to create. You also need to create the navigation aids that are used in an approach such as ILS's, markers, VOR', and NDB's.

Now it's time to create the cities and roads through the country. You can create also these objects very easily with Airport. Don't try to be perfectly exact for these, since it's very hard to have roads and houses/buildings be correctly situated. Use trees to fill up the scenery, and cars, ships and helicopters to make the scenery more vivid. However, don't forget that the more objects you make, the lower the frame rate will be when flying in your scenery. To help, you can use the detail option in Airport. After you created the objects in Airport you can continue working on your scenery with SCASM, especially since Airport can only work with a relatively small number of objects.

The last step is to create the navigation aids that you haven't already created with Airport. For this part, the best program is BGLGEN. You can create long lists of VOR's, NDB's, and ATIS's. Pay attention to the range of these navaids as some have a range of only 40 nm, others have a range of over 100 nm.

Now you can start your first flight in the area you created. Enjoy the objects and try to land with help of your ILS's and markers. And don't forget to distribute your scenery, so other people can also enjoy yours and vice-versa. Learning to create scenery can be a bit though and demands some perseverance, but after you get down the learning curve, the satisfaction of being able to make scenery for your favorite area is extremely rewarding It takes quite a lot of time to generate a detailed scenery area, so perhaps you can enlist the help of fellow flight sim friends and assign each of you different portions of the scenery to develop. I hope this article will spark at least some curiosity and prompt you to make your first step into becomming a fellow scenery designer.

About the author - Matthijs Becker is an avid flight simulation enthusiast living in the Netherlands. If he is not flying, then you'll find him designing scenery for his native homeland. He can be reached via email at [L.J.Becker@inter.nl.net] on the Internet. [MW✈]

THE PILOT SHOP

Hot Download Files For Flight Sims
(pictures on next page)

B777PNL1.ZIP (Bytes: 112KB)

Author: Budi Mulyanto
Location: www.microwings.com

The world's newest, most advanced aircraft (the Boeing 777) just would not be quite right - being flown with a Learjet panel. Budi has come to rescue here, not with a patched fix, but with a stunning - glass cockpit - very nicely rendered - Boeing 777 cockpit. This is one of, if not the, best airliner panel available to date. If you like ATP style flying, are a member of a virtual airline, or just want the hot stuff for FS5, then this panel has certainly earned a deserved spot on your hard drive. The screen shot shown was taken in the MW DFW scenery, facing the SimuFlite building on the DFW property.

B737_3JM.ZIP (Bytes: 170KB)

Author: Jan Moons
Location: www.microwings.com

Sure, you can find other Boeing 737 aircraft for FS5, but not one like this! The aircraft is well done down to the detail markings on the engine nacelles. The nose of the aircraft is the most accurate rendering we have seen to date (compare it to a photo of the real thing!). If you have the "see own aircraft" option on, then if select the rear-view, you will actually see into the passenger (pax) cabin, complete with a flight attendant standing in the aisle. Another feature that sets this 737 apart from others is the professionally designed and tested (by a 737 officer) flight model.

CLASSIC1,2,3.ZIP (Bytes: ~175KB each)

Author: Carsten Brettschneider
Location: CompuServe FSFORUM (Lib4)

The three files that make up the classic panel collection from Carsten, cover jet fighters, open air cockpits, and airliners. The open air cockpit panel takes the sopwith camel to the modern age of panel instruments and features. The jet fighter cockpit (shown in the screen shots) will satisfy the combat itch in most of us - buzz the dynamic scenery on Meigs field and the tower!). The airliner cockpit supports 2, 3, and 4 engine jets.

FLTPLN31.ZIP (Bytes: 837KB)

Author: Math Maessen
Location: www.microwings.com

Another flight planner? Yes, but this one sports some high-end features not normally found in freeware/shareware style flight planners. FP3.1 will read your scenery BGL files to populate its databases, has maps to plot against from all over the world, generates nicely detailed and formatted flight plans, can show maps of your flight including your approach, and can also generate maps of your scenery files. Well worth the download!

LONGEZ.ZIP (Bytes: 38KB)

Author: Brian Gonzales
Location: www.microwings.com

Quiz time: What has turned out to be one of the most popular kit-planes ever made, but has been nowhere to be seen in FS5? Answer: The Long EZ. Well, not anymore. Brian has produced an exceptionally nice rendering of the EZ - especially considering the difficulties in designing an airframe of this nature in FSFS, and in the flight model creation of a canard equipped plane. The screen shot shown, depicts a familiar view over the MW DFW scenery's Addison airport - where there are *many* Long EZ's flown in real life.

L188S.ZIP (Bytes: 224KB)

Author: Kenneth J. Kerr
Location: ourworld.compuserve.com:80/homepages/sqp

The eternal Lockheed L188 Electra - a four engine turboprop airliner. This combo set (airplanes and panels) from VIP (Visually Incredible Panels) features the L188 in 4 different airline liverires (AA, KLM, Western, and Braniff). One of the really nice touches, is the accurate recording of the L188's Allison engines. You really hear the drone of the engines with the included wav file - you have to experience it to know just how nice this is! L188S.ZIP is shareware - registration is $30 for the four planes mentioned, or $15 for just two. Screen shot taken at one of the terminal buildings in MW's DFW scenery.

PC9VIP.ZIP (Bytes: ~261KB)

Author: Kenneth J. Kerr
Location: ourworld.compuserve.com:80/homepages/sqp

Another combo set (aircraft and panel) from VIP. This one featuring the Pilatus PC-9/Raytheon Beech Mk.2. The package is also shareware and features the custom panel and 3 versions of the PC-9. Screen shot taken at MW DFW's Redbird airport.

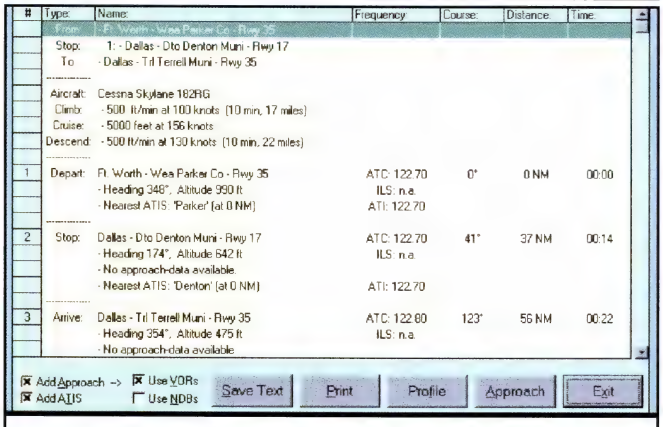
If you do not have a modem... MW will be happy to provide you with whatever files you are wanting. Contact us via telephone, fax, or mail for file availability, ordering information, etc. For this service, we charge $5 per disk (USA) or $8 per disk (Int'l). Note that this is a per disk charge, not a per file charge. A disk is a 3.5", 1.44 MB floppy. If more than one file will fit on one disk, then you only pay for one disk. *[MW✈]*

CLASSIC2.ZIP - A classic jet fighter (comes in 1 and 2 engine models).

CLASSIC3.ZIP - A classic airliner cockpit (comes in 2, 3, and 4 engine models).

B737_3JM.ZIP - A Boeing 737-300 with a ***very*** realistic flight model.

LONGEZ.ZIP - One of the world's most popular kit-planes.


Type:
Name:
Frequency:
Course:
Distance:
Time:
Stop: 1: - Dallas - Dto Denton Muni - Rwy 17
To: - Dallas - Trl Terrell Muni - Rwy 35
Aircraft: Cessna Skylane 182RG
Climb: - 500 ft/min at 100 knots (10 min, 17 miles)
Cruise: - 5000 feet at 156 knots
Descend: - 500 ft/min at 130 knots (10 min, 22 miles)
1 Depart: Ft. Worth - Wea Parker Co - Rwy 35 ATC: 122.70 0° 0 NM 00:00
- Heading 348°, Altitude 990 ft ILS: n.a.
- Nearest ATIS: 'Parker' (at 0 NM) ATI: 122.70
2 Stop: Dallas - Dto Denton Muni - Rwy 17 ATC: 122.70 41° 37 NM 00:14
- Heading 174°, Altitude 642 ft ILS: n.a.
- No approach-data available
- Nearest ATIS: 'Denton' (at 0 NM) ATI: 122.70
3 Arrive: Dallas - Trl Terrell Muni - Rwy 35 ATC: 122.80 123° 56 NM 00:22
- Heading 354°, Altitude 475 ft ILS: n.a.
- No approach-data available
Add Approach -> Use VORs
Add ATIS Use NDBs
Save Text
Print
Profile
Approach
Exit

FLTPLN31.ZIP - Flight Planner 3.1, detailed plan view.

B777PNL1.ZIP - A stunning Beoing 777 glass cockpit panel.

L188S.ZIP - L188 Electra Plane & Panel combination set from VIP.

PC9VIP.ZIP - Pilatus PC-9 Plane & Panel combination set from VIP.

Looking Beyond Today's 3D Graphics Displays

by Bruce Artwick, Chairman, BAO Ltd.

Back in September of 1993, when Microsoft Flight Simulator 5.00 was released, texture mapped graphics running in real time were quite unique. There were a couple of other products that had tried it earlier (Strike Commander for example), but these earlier attempts yielded frame rates too slow for an interactive simulation on anything less than the top of the line 33 MHz 486 with 8-meg of RAM, and who could afford one of these high end machines!

Things have sure changed in three years. You can now pick up a 120MHz Pentium machine with a couple of Gigs of hard drive and 16meg EDO memory for just a couple thousand dollars, at any number of places in your town (even if you live in a small town). Entertainment titles featuring texture mapped graphics are common place.

I sometimes wonder where 3D simulation displays can go from here. There are a few obvious improvements that will occur in the near future. Frame rates will go up due to graphics accelerators, and simply because the processor speeds will go up. This trend is somewhat mitigated by the more prevalent use of the 'C' programming language which tends to hurt display performance, but this is a one time thing. Even after everyone has switched to 'C', 'C++', or the current high-level-language-de-jour , the processor speeds will keep going up. A recent survey of device technology experts say that Moore's Law (performance doubles every 18-months) should hold for about 15 more years. Over 15-years, processor performance could increase 1,000-fold if this is true.

A few graphics techniques to clean up the quality as well as improve the speed will also be incorporated. Mitt-mapping, a technique that uses variable resolution texture mapping with tri-linear interpolation, and anti-aliasing techniques will help clean up pixelization problems and the "noise" that develops when viewing a texture at a great distance. At some point, we should have what looks like a motion picture on your computer's monitor - just what we always wanted.

This doesn't leave me too excited though. Maybe it's because this is what I've been working towards for 20-years, and the end result is nothing more than what looks like a motion picture to anyone except the pilot flying it who is having an interactive experience. They've been making great looking motion pictures in high resolution color since the 1940's.

What begins to excite me is what lies beyond the motion picture on the monitor. There are experiences in people's lives that make a huge impression that they never forget. One of mine is sitting in the pilot's seat of a 737 simulator at Boeing in Seattle. This was a full motion platform, full 3D visual system using multiple displays, caligraphics display technology (raster scan and vector graphics simultaneously), and collimating mirrors to effectively change the view depth to infinity. Taking off in that simulator was amazing. The graphics really weren't that great. You could certainly tell they weren't real, and they didn't really resemble a motion picture. They looked purely synthetic, but it felt like you were really moving and flying through this crude, synthetic world. For a moment, I was no longer at Boeing Field. I was flying through space, and although it looked unreal, all my senses told me that I was really there moving at 300 knots.

Another experience that still leaves me amazed is going to a private screening of a new (for the mid 1980's) motion picture process in Los Angeles. The "Show Scan" process, developed by Douglas Trumbull (special effects guy on 2001 - A Space Odyssey, Silent Running, and other way-ahead-of-their-time motion pictures) relied on 70mm film moving along at 60 frames per second, four times the film area and more than twice the projection rate of normal motion pictures. There was also something about using a tremendous amount of light that would immediately burn up normal 70mm film if it were being projected at the standard rate.

Trumbull's theory was that what you perceive as reality, at least for objects more than 20-feet from you, isn't so much based on whether it has a 3D effect, but rather on its image fidelity and fluidity. Psychological studies have shown that once you hit about 60-frames/second something magical happens. Although the image subjectively looks about the same as a projection at 20 frames/second, at 60 Hz your mind flips a switch that says "this is real". And it worked!

Trumbull, being somewhat of a practical joker, began the film by filming a 16mm film of some fireworks - scratches, crackly sound and all. Then he let the 16mm film burn and look like the projector broke down. Then the theater lights came on and a technician walked out in front of us telling us they had technical problems. We were under-whelmed and disappointed, until we began to realize that the technician wasn't really there - he was part of the movie. The theater lights weren't on. The movie was so bright that it lit up the whole theater as a large window to a sunny day would have. He then went to a control console on the floor and said "maybe this would interest you instead". He threw a switch and we were going down a mountain road at about 80 mph on a motorcycle. It was real. You could feel it in your eyes, ears, and stomach.

It's too bad Show Scan technology never caught on. It was just too expensive. I have seen IMAX films at entertainment facilities and at NASA Kennedy Space Center, but they just aren't the same.

Motion picture quality flight simulator images on a computer monitor in front of you are just a beginning. You have to look beyond today's 3D graphics displays to find the real excitement. Super frame rates, super resolution, collimating mirrors, high light intensity, and other exotic technology is where the real excitement is.

One last note: I know it may just be a matter of personal taste, but how enthusiastic am I about virtual reality headgear? About as excited as I get about a good pair of headphones! Not very. *[MW✈]*

PLANNING FOR A COMPUSERVE FSFORUM FLYIN

Flyins are my favorite CompuServe activity. Just after Flyin 1, I joined the GAMERS Forum (the predecessor of today's FSFORUM). Every Flyin is a special treat for me. These are the locations that the Flyins have visited in the past...

Flyin 1	Champaign, Illinois	Flyin 6	Reno, Nevada
Flyin 2	Oshkosh, Wisconsin	Flyin 7	Washington, D.C.
Flyin 3	Seattle, Washington	Flyin 8	St. Louis, Missouri
Flyin 4	Ithaca, New York	Flyin 9	New York, New York
Flyin 5	San Juan, Puerto Rico	Flyin 10	Kingston, Jamaica

We are going to Nevada again for Flyin #11. So it's time to get out the charts and start planning. While I can't plan your route, I will share with you the planning and practice steps I go through to prepare for the Flyin. A review of my steps may help you prepare for the Flyin. For my flight I will be using the default Cessna 182RG, Flight Simulator 5.1 CD, the ISS Scenery Sets, and Flight Simulator Flight Shop. You may choose to use a Flight Planner to help plan the route. If you do use a planner you should also check the charts for the various cautions I outline below.

My flight plan will duplicate, as closely as possible, a plan that a real world prudent pilot might use. To accomplish this, I will plan an Instrument Flight Rules (IFR) flight following generally accepted routings. Therefore my first steps are to consult an Atlas to define the route. From the general plan I will collect the appropriate "IFR Enroute Low Altitude" charts for the route. If you are uncertain about the charts you may wish to consult two articles about charts in previous issues of MicroWINGS (V3N3 and V3N4).

In this article I will mention a number of files that you can download. Table FI.2 describes these files. Whenever I refer to a file name please check Table FI.2 for more information on the file. My flight will originate from my home airport in Gaylord, Michigan (GLR). From Gaylord the route will go south around the lower end of Lake Michigan. Remember the word "prudent," many of the local northern Michigan pilots do not consider it prudent to take a small plane across Lake Michigan. At 12,000 feet the Cessna will glide about 24 miles. Since Lake Michigan is about 70 miles wide, this could lead to a 10 mile swim. Therefore, my course will head south to the lower end of Lake Michigan. It then heads west. This also keeps the route south of the Chicago Class B airspace. The route then continues on through Moline, Des Moines, Omaha, Denver, Grand Junction, and then southwest to Las Vegas. For personal reasons I will break the flight into four segments with overnight stays at Moline, Illinois, Curtis, Nebraska (did you think I could pass an airport named Curtis), and Grand Junction, Colorado. This will make the 1,700 mile flight a bit more manageable.

For my plan I will refer to NOAA "IFR Enroute Low Altitude" charts. Gaylord is on Chart L-12. The other charts I will use will be L-23, L-11, L-6, and L-5. There is a catalog of NOAA charts in Library 15, MicroWINGS on CompuServe. In the Library, file NOAAINDX.TXT is an index of the 20 page NOAA catalog. This file contains a map showing the coverage of the Low Altitude charts. These charts are inexpensive and you can purchase them at most general aviation airports or from Sporty's, 1-800-543-8633.

When you open a Low Altitude chart you will see lots of lines and circles along with a bunch of cryptographic text with very little geographic features. Try to find your home airport. It may be one of the large circles or it may be a very small circle. Fortunately Gaylord is one of the large circles. The large circles with degree markings are Visual Omni Range (VOR) beacons. Until Flight Simulator adopts GPS, INS, and Loran, these VOR's will be the basis of cross country flight. Between VOR's you will find lines with bold number boxes containing a "V" number. These are the Victor, or VOR, airways. IFR flights will generally follow these airways. Following the Victor airways will generally insure flights through safe areas, avoiding the Military Operation Areas (MOA's) and restricted airspace. If you violate these you might get shot down or escorted to a nearby airport by a rather nasty looking virtual military airplane.

From Gaylord the flight will follow V-215 past the White Cloud VOR to Muskegon VOR. From there the flight follows V-55 past Pullman and Keeler to the Giper VOR. From Giper we head south on V-156 to the NOMES intersection. An "intersection" is a small triangle with a five character name where two routes or VOR radials intersect. If you are using a planner such as FSFS you may have to enter the intersection information in the planner's database. The NOAA charts give the required latitude and longitude information. Intersections are not navigation aids in the sense that they do not send out signals. Instead they are located by distances and directions from VOR's. At the NOMES intersection the route turns West and follows the V-8 airway. The route stays with V-8 all the way to Las Vegas. Table FI.1 lists the entire route along with the names, frequencies, and identification codes for the various waypoints.

The chart also gives us other critical flight information we will need for the flight. Just above the block holding the "V" number

From	To	Airway	Destination	Freq	Course
Day 1			Otsego County	109.2	
GLR	HIC	V-215	White Cloud, MI	117.6	211F/208T
HIC	MKG	V-215	Muskegon, MI	115.2	211T
MKG	PMM	V-55	Pullman, MI	112.1	184T
PMM	ELX	V-55	Keeler, MI	116.6	182T
ELX	GIJ	V-55	Giper, MI	115.4	201T
GIJ	NOMES	V-156	NOMES INT, IN	115.4	209F
NOMES	CGT	V-8	Chicago Hgts, IL	114.2	267T
CGT	JOT	V-8	Joliet, IL	112.3	271T
JOT	MZV	V-8	Moline, IL	114.4	261F/T
MZV	MLI	V-8	Quad City	116.2	027F
Day 2			Quad City		
MLI	IOW	V-8	Iowa City, IA	116.2	270T
IOW	DSM	V-8	Des Moines, IA	114.1	263F/T
DSM	OMA	V-8	Omaha, NB	116.3	254F/T
OMA	GRI	V-8	Grand Island, NB	112.0	257F/T
GRI	47V	V-8	Curtis Muni	177.7	246F/T
Day 3			Curtis Muni		
47V	HCT	V-8	Hayes Center, NE	117.7	230T
HCT	AKO	V-8	Akron, CO	114.4	250F/246T
AKO	DVV	V-8	Mile High, CO	114.7	242F/242T
DVV	RLG	V-8	Kremmling, CO	113.8	264F/260T
RLG	RIL	V-8	Rifle, CO	110.6	231F/232T
RIL	GJT		Walker Field		225F
Day 4			Walker Field		
GJT	JNC		Grand Junction, CO	112.4	240T
JNC	HVE	V-8	Hanksville, CO	115.9	232F/231T
HVE	BCE	V-8	Bryce Canyon, UT	112.8	226F/225T
BCE	MMM	V-8	Mormon Mesa, UT	114.3	225F/243T
MMM	CROWE	V-8	CROWE Int. AZ		168F
CROWE	LAS		McCarran Int'l	116.9	255T

Figure FI.1 - Our flight plan to Flyin #11, spanning 4 days of flying.

is a small "thousands" number that is the minimum altitude for the segment. In the mountains this number is very important as flying into granite can ruin a perfectly good day. Sometimes these numbers will have arrows indicating minimum altitudes for the direction of flight. Next to the VOR compass rose where the line leaves the circle will be a degree number. The degree number is the direction of flight "FROM" the VOR. When flying towards the VOR you add 180 degrees to the number to find the course "TO" the VOR. These course degrees are in Table FI.1 in the column "Course."

Many of the flight segments will be greater than 80 nautical miles, the maximum range of the FS VOR transmitters. This means we will fly from the VOR behind us until we get in the range of the VOR ahead of us. The FROM and TO courses are shown in Table FI.1 in the "Course" column as nnnT/nnnF. For example, when I leave the Gaylord (GLR) VOR I find the White Cloud (HIC) VOR is out of range. You would fly the 211 degree course "FROM" GLR until the HIC VOR can in range. You would then retune the OBI to 208 and fly this course "TO" the VOR. You may wish to make note of these headings as the FS Air Traffic Control (ATC) will give directions only to the nearest 10 degrees.

To make the flight more realistic I am going to use the ATC function of the FS Flight Shop (FSFS). However, before using FSFS, be sure to apply the FSFS501.EXE patch. Without the patch the printed Flight Plans generated will give misleading courses — the magnetic deviations are missing. You may also want the Change Assigned Altitude module, MWALTCHG. Be careful using this module. On one of the practice flights I experienced a mountain crash when I was above the minimum crossing altitude. Flight Simulator resets the ground altitude when passing near an airport. If there are no airports along the way the ground elevation corrections are not made. Since the ground elevation where I crashed was much lower than my departure airport, the mountains I crashed into should have been lower. If you want to see this effect in action fly towards Denver from an eastern low altitude airport. As you approach Denver the mountains will appear. As you fly over a Denver airport you will see the mountains rise in front of you.

There is another point about Flight Simulator and FSFS I learned the hard way. When you are using the FS autopilot to fly a VOR1 heading be sure to turn off the Nav1 Hold function before you are closer than one nautical mile to the VOR. For some reason the autopilot becomes erratic when very close to the VOR. When I am almost to the VOR I do a Ctrl-N to shut off Nav1 Hold and then I do a Ctrl-H to turn on the Heading Hold. When I am more than a mile past the VOR I do the reverse to switch back to VOR1 Hold. If a course change takes place at the VOR, FSFS ATC will clear you to the next waypoint about four miles before you reach the current waypoint. At this point I switch off Nav1 Hold, make a course correction equal to about half the change, switch on the Heading Hold, readjust Nav1 and then when wait for the needle to center after passing the VOR. As the needle centers I switch back to Nav1 Hold.

Before entering the waypoints for the flight plans, enter the data for any intersections into the NavAids database. Since I will be flying the route on four different days I will make four flight plans. Day 1 will take me from Gaylord to Moline; Day 2 will go onto Curtis, a little airport I found in Nebraska. Once this is done, you can enter the various waypoints into the plan. Save each of the plans. Then file each plan with the Flight Service Station (FSS). If you know the local radio frequencies you can enter them as you file the plan. This will make a more realistic flight. Be sure to check the Clear Weather feature if you are flying into an airport that does not have a published instrument approach. FSFS may just let the weather deteriorate to the point you can't land. Filing the Flight Plans create Adventures

Description	File Name
NOAA Chart Catalog	NOAAINDX.TXT
Enroute Low Alt Charts	NOAA-P08.ZIP
Enroute Low Alt Charts	NOAA-P09.ZIP
East ISS Scenery Set	ESTISS.ZIP
WestISS Scenery Set	WSTISS.ZIP
FSFS Altitude Change	MWALTCHG.ZIP
Ground Proximity Alarm	MWGRDPRX.ZIP
FSFS Patch	FSFS501.EXE
FSFS GPS Module	MWGPS.ZIP
FS4 Omaha to Reno Scenery	OMARNO.ZIP

Figure FI.2 - Files that can be used to enhance your flight to LAS.

for each day. It is time for a personal confession. On the day of the Flyin I don't want anything to fail and spoil my arrival. Maybe it's a bit of ego, but I want to know that I will arrive and be on time. Therefore, I will fly each segment at least once. If I should run into any surprises I will adjust the plan and fly it over and over until I get it right. At this writing, I really don't know what kind of "Air Traffic Control" will be used so I will pay close attention during practice to the actual time it takes me to fly between waypoints. In the two previous Flyins, those who followed the IFR arrival procedures were instructed to use an FAA Standard Terminal Arrival (STAR) chart. These were provided as part of the Flyin Sign-on package. If you are curious and have access to the U.S. Terminal Procedures Southwest (SW-1) you can preview the three STARs for McCarren International Airport in Las Vegas. The CRESO THREE ARRIVAL depicts an arrival from the Southwest; CROWE SIX shows an arrival from the Northeast, the one I would most likely use; and FUZZY THREE describes an arrival from the Northwest. If you're really into IFR with FS I recommend you acquire one of these books. There are just over $3 each and are available from the chart sources I mentioned earlier.

At this point I am going to insert a personal opinion about autopilots. I use the FS autopilot just as most pilots would do if they had one in their airplane. The autopilot lightens the load on the pilot and gives time to deal with radio navigation and the demands of the ATC. However, I personally do not use the Flight Planner Auto Pilot (FPAP). My reason is that I use FS to simulate real world flying but I'm not quite convinced that the FP autopilot is realistic. I think that an autopilot that flies the entire flight plan from just after takeoff to final approach is not realistic for a Cessna pilot. Perhaps if I was flying some the very expensive and sophisticated aircraft with flight management computers I might try FPAP.

If you are going to fly to Las Vegas using Flight Simulator Version 4.0 and you are coming from the East you may want to use scenery created for Flyin 6. The file is OMARNO.ZIP in the CompuServe Library 19. This scenery provides a path from Omaha, Nebraska to Reno, Nevada. In addition to the standard FS 4 scenery features it includes a number of historical sites such as Chimney Rock, Fort Bridger, Independence Rock, and Oregon Trail wagon wheel ruts. You could turn off to Las Vegas by going south from Salt Lake City or Reno.

High speed, high altitude jet drivers may prefer to use a GPS course to Las Vegas. MicroWINGS FSFS module MWGPS.ZIP provides such a function. This could bring you close to Las Vegas where you would switch to the published Flyin 11 approach procedures. On the day of the Flyin let's see if we all can establish a new record for Flyin arrivals. See you there!

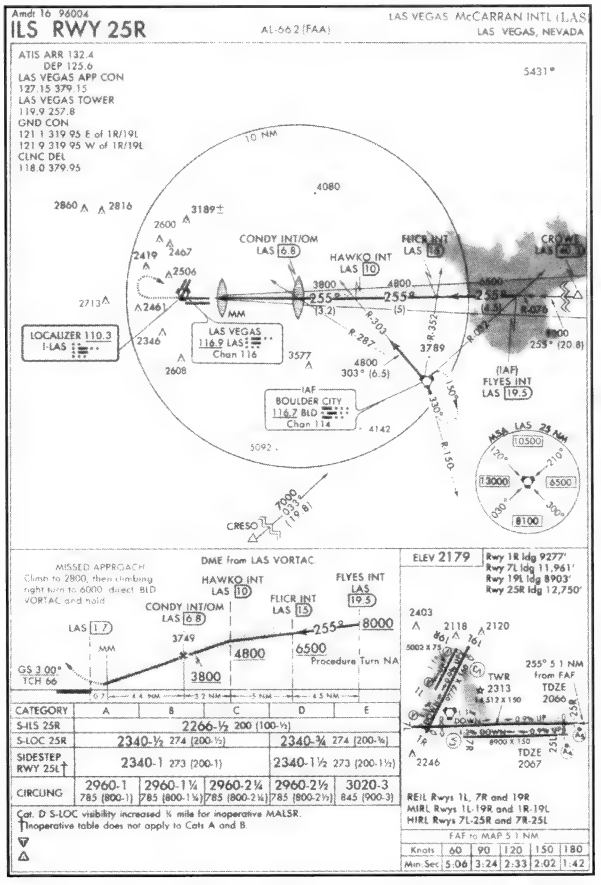


Figure FI.3 - The ILS 25R Las Vegas Instr. Appr. Plate

Flyin #11 Details

The next Flyin is set for May 4th, 1996. There will be many features to this Flyin that will make it the most realistic virtual Flyin ever held. Some of the features are as follows:

1) A custom adventure for those who have Flight Simulator Flight Shop, has been developed by MicroWINGS to guide pilots into Las Vegas using official CROWE-6 and CRESO-3 STAR (Std. Terminal Arrival) vectors and altitudes. Flexible entry points are computed by the adventure's virtual ATC to bring you into the STARs at either Milford, Bryce Canyon, Hanksville, Peach Springs, Hector, or Daggett. For those taking off within the STAR, ATC can also route you into the STAR at Danby, Creso, Woolf, or Punns. Realistic ATC and missed approach handling are also featured.

2) A custom scenery BGL has also been developed to add a well rendered LAS-McCarran Int'l for users who do not have BAO's Las Vegas scenery add-on.

3) Use of a custom Flight Shop generated flight plan for uploading/filing to CompuServe's FSFORUM.

4) Human Approach (via telephone) for assignment of runways (Towers) and/or holds if the pattern is full.

5) Human Towers (via Dual Player links) for interactive Tower communications. Combined with the Human Approach and custom Flight Shop adventure, missed approaches and go-arounds can now be handled in real-time.

6) Flight Photo contest. Take flight photos while enroute of anything that catches your eye. Prizes include free connect time and MW memberships / renewals.

Don't miss this Flyin. These events alone are reason enough, to join CompuServe and their flight simulation forum (GO FSFORUM).

About the author - Phil Curtiss is an avid aviation enthusiast both on CompuServe (ID 72230,1163) and at the EAA conventions in Oshkosh, WI. He has written numerous articles on Flight Simulator and has presented three Flight Simulation topic forums at the EAA Conventions. [MW✈]

Review of...

Jeppesen's FS-200

Wow! That was my reaction the first time I fired up Jeppesen's FS-200 IFR flight simulator. The graphics technology employed for the aircraft panel is awesome - the instruments look and behave like actual aircraft instruments. There are no "jaggies" the instruments move in a totally smooth manner, and the needles don't jump from pixel to pixel.

The FS-200 is Jeppesen's entry into the very competitive PC based IFR training and proficiency software market. This simulator is an outgrowth of MDM System's original FS-100 simulator which received rave reviews as one of the most realistic IFR training packages on the market. In 1995, MDM was purchased by Jeppesen Sanderson and the team that developed FS-100 continued to perfect the program and has now brought us FS-200.

Figure JFS.1 - The new, photo-realistic panel of the FS-200.

The most noticeable upgrade is the fantastic graphics engine used in the FS-200 package. Upon entering the simulator, the user is presented with a Beechcraft Bonanza panel complete with Allied Signal (King) avionics. Everything looks very life-like down to the actual manufacturer's labels on the flight instruments. High resolution graphics are employed. I could not find any documentation of the number of pixels, I believe it to be 800x600 and the anti-aliasing techniques makes it look photographic. With a 20 inch monitor, the instruments are approximately the same size as a real aircraft's instruments.

The FS-200 will be available in two basic formats. The standard system comes with the same stand-alone instrument console that came with FS-100 and is priced at $799.95. An advanced console is offered with the FS-200 for $1,495 - it comes with a high end throttle quadrant and instrument panel combination. Both the standard and advanced package are now shipping and come with a CH Products Virtual Pilot Yoke (rudder pedals are optional). I used the standard version since I already had the standard console from my FS-100 days. Packaged with the software is an owner's manual in a standard Jeppesen binder, a Jeppesen Video on approach charts, US Flight Planning Chart, and one years' worth of revisions to the database. The FS-200 database covers all of North America.

System requirements are an IBM compatible PC using an 80486 25MHz or higher processor, Pentium or Pentium Pro processor, 8MB of system memory, 5MB of hard-disk space, an SVGA card with at least 1MB of video memory, and an SVGA monitor. A sound card is recommended to hear the sound features and to hear Air Traffic Control with optional ATC modules. ATC modules for South Florida, Southern California, portions of the Northeast, and the Chicago area are available for $49 each.

Using The FS-200

Using the software is identical to using the FS-100 (reviewed in the Vol. 1, No. 4 issue of MW Magazine). There is no learning curve at all. Anybody that has used

FS-100 can get by without even cracking a manual. For people that have used other flight simulation products, there is also virtually no learning curve. The program does not rely on any keystroke combinations and is fully controlled with the supplied console. Menus are accessed via a standard mouse driven pull down user interface.

The simulator revolves around two basic screens - the cockpit screen which includes a view of the instruments and navigation gear, and the map screen. The map screen has pull down menus which allows the user to customize the simulation, select weather, reliability of the aircraft systems, home base, and many other options. The map display is capable of recording your entire flight in plan view and in profile view. Any deviations from course or altitude can be easily seen and played back, thereby enhancing the learning process. Flap position, landing gear position, airspeed, altitude, and heading are also recorded. This is very useful for assessing how well your flight went.

Cross-Country With The FS-200

Now that we have the formalities out of the way, in order to test the FS-200, we will take a cross-country flight from my home airport in Chandler, AZ to Lindbergh field in San Diego for a visit to SeaWorld. This time of the year usually brings a marine fog layer for the San Diego area so we will undoubtedly have to fly the ILS at SAN all the way to minimums before breaking out. Lining up on runway 22L at Chandler I check my clearance which tells me that I am cleared to SAN via radar vectors to the Gila Bend VORTAC (GBN) then on V66 (Victor Air Route #66) to Imperial (IPL) where I am to fly the Baret 4 Standard Instrument Arrival (STAR) into San Diego. This arrival procedure is defined by a series of intersections commencing at Imperial, California. My altitude will be 12,000 ft.

Chandler tower gives me my takeoff clearance and I push the throttle of my simulated A-36 Bonanza forward on the FS-200 flight console. The airplane accelerates and we lift-off at 75 knots, gear comes up, and we are already entering the clouds. I contact Phoenix departure and am given a vector of 250 degrees to intercept the Gila Bend 235 radial. Climbing through 7,000 ft, I am established on-course to Gila Bend and Phoenix departure hands us off to Albuquerque Center. So far everything in FS-200 is acting exactly as it would in real life - a very realistic training experience.

Now it is time to test the autopilot, I select the 235° heading using the heading bug and engage the A/P. I trim the A/P for a 500 FPM climb. When I am approaching the assigned altitude of 12,000 feet, I trim for level flight and engage altitude hold. I set the engine for 60% power because at 12,000 feet, without a turbo-charger, that's all my simulated Continental IO-550 engine can produce. The speed accelerates to about 165 knots, pretty much what the book says it should do.

Flying past Yuma we are handed off to Los Angeles Center. We pass Imperial and so far the flight is uneventful - we haven't seen the ground since leaving Chandler. Fuel consumption is quite a bit lower than the Beech manual says, I am only using about 11 GPH where I should be using more like 14 or 15. We are now established on the Baret4 arrival even though we are still 80 miles away. Los Angeles center turns us over to SOCAL Approach and we are cleared to descend to 8,000, then 6,000 and then turned over to San Diego Approach where we are assigned the ILS Runway 9 approach.

Measured ceiling is 400 feet and visibility is 1 mile in fog - right at the minimums for this approach. San Diego Approach vectors us out over the Pacific Ocean at 2,000 ft and we are cleared for the approach. There's the outer marker, gear coming down, approach flaps set, 15" of manifold pressure to maintain the glideslope at 100 knots, and down we come. Out of 1,000 descending, 500 ft, we are still in the murk, approaching 350 feet, just as we were ready to bring in the power for the missed approach, the runway lights started showing through the fog. Since we had the runway environment in sight, we continue the approach all the way to a successful landing. I am hoping the whales and dolphins at Sea World are instrument rated.

Post Flight

This entire trip was done on the FS-200 is under two hours as it would be in a real Beech Bonanza, I did not have to stop and change databases at any time as is the case with some programs in this category of software. The Air Traffic Control I described was my own fantasy but with the ATC add-on modules, a similar flight would be possible as long as it is a route of flight covered by one of the modules. The realism is very high due to the physical panel where you tune radios, select flaps, and select the landing gear with.

Ultimate Realism

There is no "mousing around". The experience would be even more realistic with the advanced package due to having a real throttle quadrant rather than small sliding potentiometers. For the ultimate in realism, a better yoke

such as those manufacture by Precision Flight Controls can be installed. An FS-200 set-up with upgraded Yoke, a 21 inch monitor and the advanced console would be the ultimate set-up - FS200 can easily accommodate these peripherals for an IFR training environment that is only exceeded by full motion simulators. With a 21" monitor, the instruments would be very close to the actual size of instruments found in a real plane. Despite this realism, programs such as this one are still not legal for logged IFR training hours even though much lesser 1960's technology, mechanical simulators *are* approved.

Jeppesen is working directly with the FAA to allow limited use for IFR training but the time frame within which approval will come is not currently known. Despite this, a program like FS-200 offers a superb training experience. An IFR pilot that uses a program like this regularly in addition to meeting the FAA currency requirements will be sharper, more precise, and much safer in real IFR conditions than a pilot that is just able to meet the minimum currency requirements. A great use for a program like this is also to practice complex approaches into airports that you will have to fly real approaches into. By flying them on the computer first, few surprises should ensue.

Wish List

My wish-list for FS-200 includes the following: Better scenery of the entire airport's runway and taxiway complex instead of just runways; A selection of several more aircraft models including a light single (Cessna 172), a light twin (Baron, Seneca, or Cessna 310), and a turbo-prop (Cheyenne, or KingAir) with their associated panels; A more powerful autopilot that couples glideslope and has VOR hold capability; Simulated Icing encounters and weather randomization; and Area Navigation such as a Global Positioning System (GPS). The GPS feature is a must for a future release as the IFR world is quickly moving toward a GPS environment.

Summary

Jeppesen has upped the ante in the IFR flight simulation software market due to its superb instrument panel - both visually and dynamically, it is the most accurate panel outside a real plane or a multi-million dollar full motion simulator that this pilot has ever seen.

About the author - E.J. Peiker is an instrument rated multi-engine pilot living in Chandler, AZ. He owns a 1979 Piper Seneca II. He is employed as a Sr. Engineering Manager at Intel Corp. [MW✈]

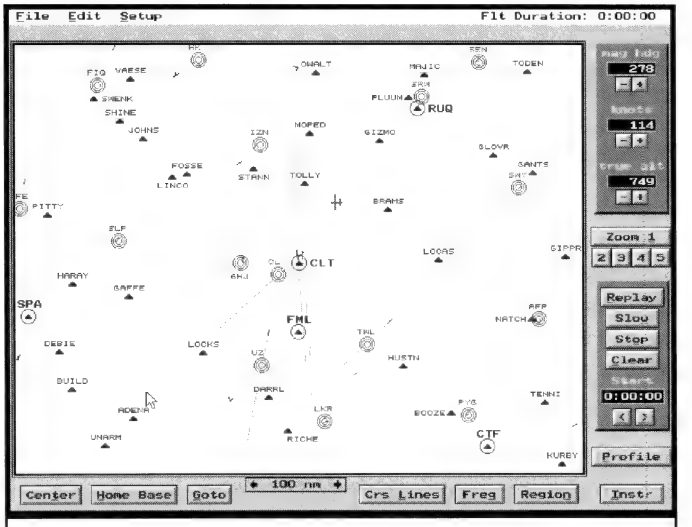


Figure JFS.2 - Map view shows you where you are, what runways are nearby, NDB's, VOR's, and Intersections/Fixes. It can also show a replay of your track across the map.

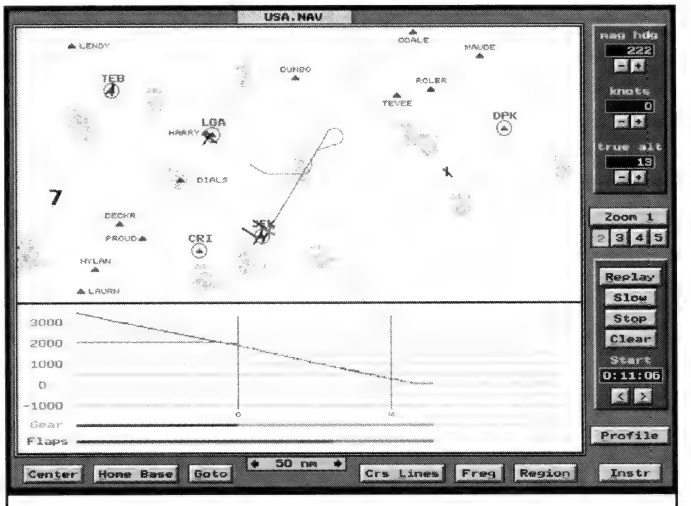


Figure JFS.3 - Profiles of your approach can also be shown with details such as when you extended your landing gear and when you applied your flaps.

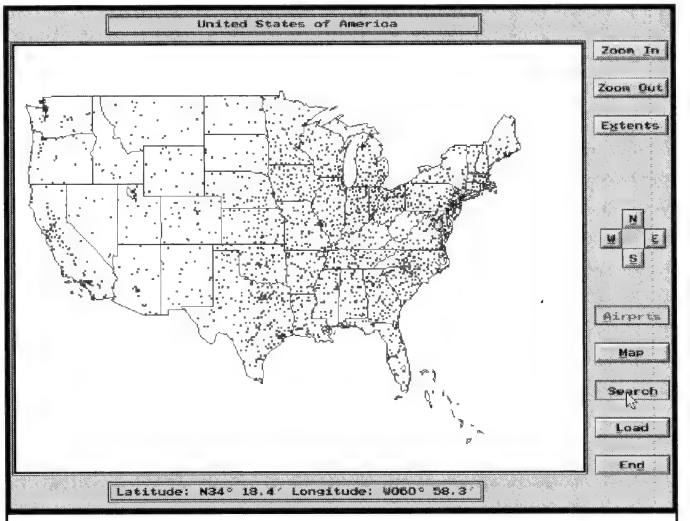


Figure JFS.4 - Here you can see the entire region covered by FS200.

A Day At The Virtual Skunk Workshop

Our cub reporter took a tour of the Virtual Skunk Workshop operations and came back with the following interview.

Figure VSW.1 - Welcome to the Virtual Skunk Workshop.

MW: (knocking on church door) *Anybody home?*

(door opened by guy with Hawaiian shirt)

VSW (Laemming): Hi, I'm Laemming. Are you the cub reporter from *MicroWINGS* that we're expecting?

(Greetings and introductions are made. The cub reporter is ushered to the front-row pew. Present are Laemming Wheeler, Russell Mueller, and Joe Lincoln of the *Virtual Skunk Workshop*. Coffee is offered and the interview begins.)

MW: *Is this really where the Virtual Skunk Workshop sessions take place? In a church?*

VSW (Laemming): Virtually, yes. Although as we grow we may have to find more virtual space.

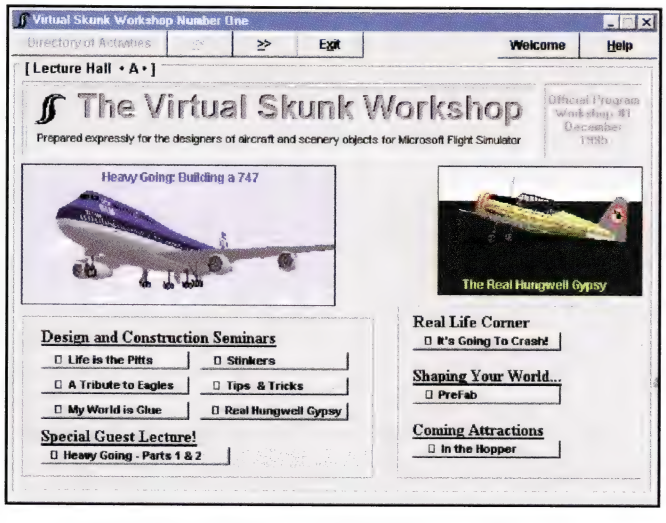


Figure VSW.2 - Cover page of VSW issue #1 Browser.

MW: *I have to ask, for the record, exactly what is the Virtual Skunk Workshop?*

VSW (Laemming): Basically it's a collection of software programs that you run on your computer that appears like a magazine or journal full of tips and tricks, tutorials and examples of how to effectively use *Flight Shop's Aircraft Factory* to design planes and even static objects. A browser program takes you to the various workshops and seminars. These are written as Windows help files, so that you can call up a session either using the VSW browser, or even from within Aircraft Factory so that you can get your hands dirty as the workshops progress.

MW: Wait a second... you said static objects?

VSW (Laemming): Yep. We all know that the *Aircraft Factory* that comes with *Flight Shop* can be used to design great looking aircraft, but in fact, with the proper tools, *Aircraft Factory's* design capabilities can easily be extended to include creating static objects that may be located anywhere on the planet.

MW: *You mean that I can design my own house in Aircraft Factory?*

VSW (Laemming): Yep. Design it and plop it down exactly where it belongs.

Figure VSW.3 - House of Arnett.

MW: *Impressive! Let's talk a bit about the aircraft design aspect of the VSW. Is it better than the manual or on-line help that comes with the software?*

VSW (Russell): It's not really a question of being better. *VSW* is an on-going supplement which goes into more depth than the manual ever could. It gives insight into the approaches to tackling design problems that are outside of the scope of AF5's documentation.

MW: OK, VSW's lecture hall is another stop we'd like to make on our VSW tour. Any other places we don't want to miss today?

VSW (Joe): I'd be happy to complete your tour by showing

you our production facilities and factory store.

(The cub reporter snaps a few more Polaroids and the group saunters off down the hallway toward the luxuriously appointed amphitheater.)

MW: *Where did the Virtual Skunk Workshop concept come from?*

VSW (Russell): This was a development from the creative mind of Laemming Wheeler. After I was invited to join the alpha test and development phase of AF5, I had the opportunity to meet Laemming in person. One concern during development was the manual for the program. We agreed that no matter how detailed the manual and help files, that most designers would be interested in developing their design skills and would welcome some help because of the depth and complexity of AF5. Additional resources would be required including the use of visual materials and examples. The VSW workshop idea is intended to convey the message that all are invited to our hands-on sessions.

MW: *And what about the name "Virtual Skunk Workshop"?*

VSW (Russell): The name connoting creativity and effectiveness in the aviation development community was conjured up while Laemming and I were walking along a runway at a local airshow in New Jersey after taking a spin in a Waco. The name made sense since the VSW workshops' mission would be to generate new ideas for all designers and help in problem solving by the examples that are included with the workshops. Subsequently, we also have taken to referring to ourselves and all our participants as the Skunk family or plain Skunks for short.

MW: *What can we learn from a Virtual Skunk Workshop?*

VSW (Russell): We recognize that everyone has a different capacity for learning, and also different interests in aircraft design. Some of our current members have shown an interest in texturing while only being mildly interested in the physical design of an aircraft; for others, just the opposite. Some are advanced and others just starting. The seminars will provide insight into design techniques, features of AF5, and also expand on the information provided in the FSFS AF5 manual and on-line help.

MW: *For example?*

VSW (Russell): In our first session, we had a look at capturing screen shots in FS5 and also had a look at the importance of using Glue Template parts. The VSW workshops are intended as hands-on experiences so the designers can get their hands dirty. Let me show you what I mean. (Rust turns on the slide projector) This is from a session in VSW issue #2 (see Figure VSW.4).

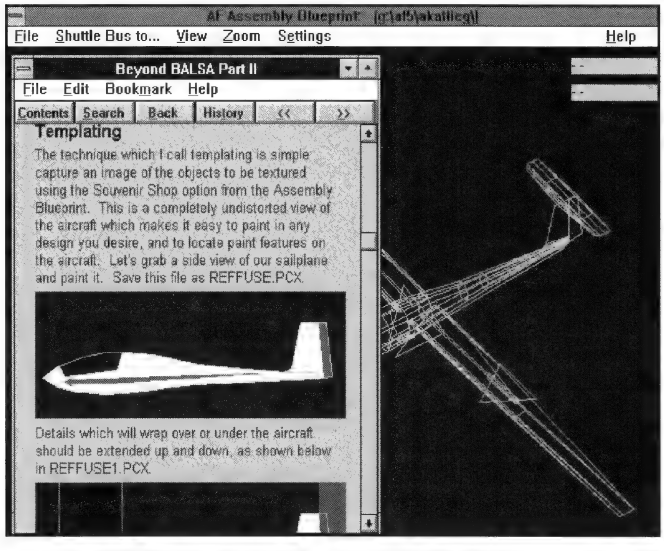

AF Assembly Blueprint: [g1af5\akatlieg\]
File Shuttle Bus to... View Zoom Settings Help
Beyond BALSA Part II
File Edit Bookmark Help
Contents Search Back History << >>
Templating
The technique which I call templating is simple: capture an image of the objects to be textured using the Souvenir Shop option from the Assembly Blueprint. This is a completely undistorted view of the aircraft which makes it easy to paint in any design you desire, and to locate paint features on the aircraft. Let's grab a side view of our sailplane and paint it. Save this file as REFFUSE.PCX.
Details which will wrap over or under the aircraft should be extended up and down, as shown below in REFFUSE1.PCX.

Figure VSW.4 - Beyond Balsa, Part II.

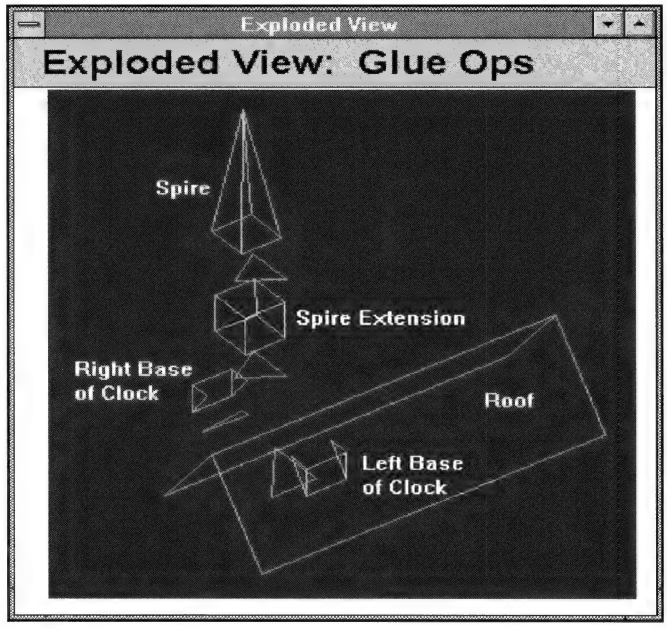


Figure VSW.5 - Hard hat area: watch out for explosions!

VSW (Russell): We try to show details that you don't normally get to see from designers, like this (see Figure VSW.5).

(Laemming takes his cue from the static object reference and invites the tour to his laboratory. The cub reporter packs up his camera and the group proceeds out the door, across the runway, past the hangar and over to the control tower.)

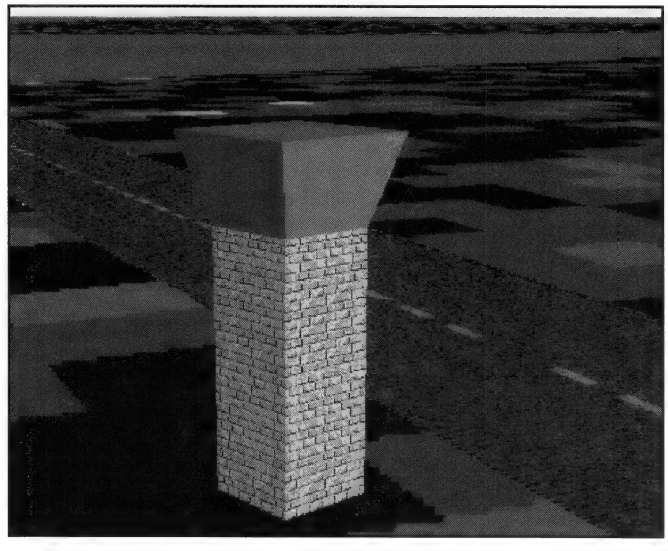


Figure VSW.6 - The fortress.

MW: *It's quite a mess in here. Where are the controllers?*

VSW (Laemming): It's an uncontrolled strip right now and

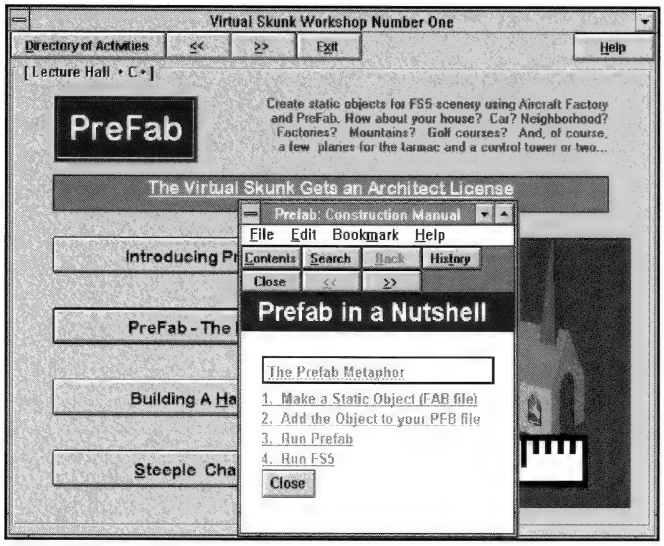

Virtual Skunk Workshop Number One
Directory of Activities
Exit
Help
[Lecture Hall • C•]
PreFab
Create static objects for FS5 scenery using Aircraft Factory and PreFab. How about your house? Car? Neighborhood? Factories? Mountains? Golf courses? And, of course, a few planes for the tarmac and a control tower or two...
The Virtual Skunk Gets an Architect License
Prefab: Construction Manual
File Edit Bookmark Help
Contents Search Back History
Close
Prefab in a Nutshell
The Prefab Metaphor
1. Make a Static Object (FAB file)
2. Add the Object to your PFB file
3. Run Prefab
4. Run FS5
Close
Introducing Pr
PreFab - The
Building A Ha
Steeple Cha

Figure VSW.7 - Make your own static objects.

I've taken over this room to work on the *PreFab* project. Let me remove a few piles of these papers so we can sit down.

MW: *PreFab project? Is that the static scenery utility that comes packaged with VSW?*

VSW (Laemming): Yes. *PreFab* is the name of the utility that comes with *VSW*. Here's how it works. Installing *VSW* will set up *Aircraft Factory* with the ability to produce files that we call FAB files. Essentially, these are static forms of objects produced in *Aircraft Factory's Assembly Line.* Now, all I have to do is make a list of which FAB objects I want to place in my scenery and supply the information concerning where, what elevation, orientation, etc. I save this file and run *PreFab* using the name of the file I just saved on the command line. PreFab will create a scenery (BGL) file according to my list of objects. It also produces a *RESULTS* file so you can confirm that everything went okay.

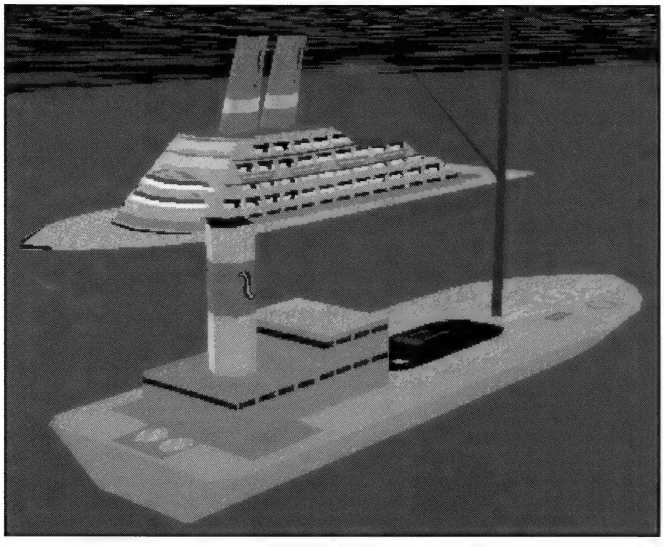


Figure VSW.8 - Sailing, Sailing...

MW: *It sounds a little like SEE04 (Laemming's scenery design utility from the days of FSv4). What's the difference?*

VSW (Laemming): SEE04 provided additional enhancement effects for FS4 scenery besides 3-D static objects. *PreFab* focuses entirely on placing custom 3-D static scenery objects in FS5.

MW: *So, you can add static objects to your existing scenery? Can you show us an example?*

VSW (Laemming): Take a look out the (bay) window. Let me clean it a little first. We can do better than that. Joe has written a story about a pilot named Clipper who...well, I don't want to spoil the challenge by spilling the beans, but I will say that the flight you need to make, while reading the story, will take you over tons of custom objects designed in *Aircraft Factory* and placed into the scenery by *PreFab*. Everything you need is in a package named VSWTAL.EXE a self-extracting zip file. Grab it from the MicroWINGS Web Page, TekMate's Home of the Skunks Page, or CompuServe's FSFORUM (See VSW sidebar.)

MW: Joe, does the Virtual Skunk Workshop also teach people how to write stories like the one called *THE SKUNK'S TALE* that comes in VSWTAL.EXE?

VSW (Joe): VSW does teach a lot of subjects, but not story writing. I did that just to add a little spice to the flight. We had a great deal of fun working together on that project. It was truly a *"joint venture"* in every sense of the word - a great cooperative undertaking. My task was to work on the little story about Clipper and the role he played and tried to come up with some objective for flying the adventure in the first place. Laemming and Russell provided the nifty objects for the adventure.

MW: *That's not the only thing you do here, right?*

VSW (Joe): My main job is running the production line and the On-line Skunk Store. Let's take a look if you like.

(The group descends the stairs, crosses the runway and enters a huge factory, obviously the Skunk's production facilities.)

MW: *Hmmm, big place but it doesn't look like a lot of produc-*

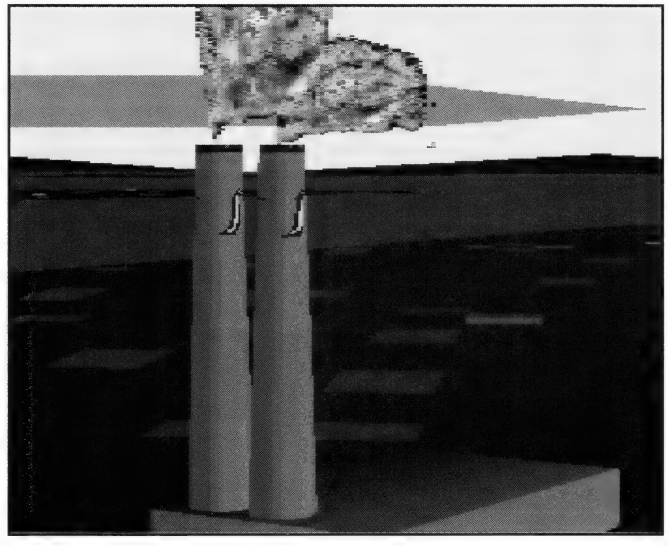


Figure VSW.9 - Steam powered disk duplicators?.

tion is going on here. Heck of a lot of phones ringing, though. How come?

VSW (Joe): That's because most of the Virtual Skunk Workshop's that go out of here to folks around the world are electronic versions. About 1-1/2 years ago, when we first started planning ***VSW*** , we decided that we did not want to publish high-priced, fancy-boxed products for sale in the stores. Just the cost of art-work and printing alone would have run the cost of our products up by more than 40% over what we currently sell them for. Add to this the cost of distribution and the prices would have gone sky high (meaning "typical"). Of course, the type of software the *skunks* are designing lends itself to being downloaded in the first place. We don't need 10 pounds of printed paper products to make it do what it is supposed to do.

MW: *That explains the phone action. No disks at all?*

VSW (Joe): Sure. We do supply disks if that's the option that's requested. There are many ways to ask for VSW and many ways to receive it: On-line Store, via Internet or CompuServe, voice phone, fax, or even snail mail.

MW: *Wow, it's late! Any final words before I take off?*

VSW (Joe): Just that it's been a pleasure having you with us. We'd like to extend through you a hearty welcome to all those prospective skunks out there who'd like to sharpen the skills, learn new tricks and share some old ones. VSW is a team effort and wants to reflect the community's interests. What are the hot areas of AF5 design; questions and certainly contributions of design tips, tricks, successes, and stumpers. *[MW✈]*

MicroWINGS Product Capsule

Product Summary: The perfect companion to *Flight Sim Flight Shop's Aircraft Factory*. Learn the in's-and-out's of designing and even 3-D static objects which you may add to your own scenery. Complete with browser, AFX source code, AF5 compatible help files, PREFAB utility, and background articles.

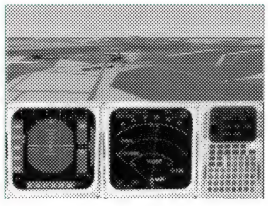
Free Samples: Look for VSWTAL.EXE on participating BBS's, online services, web, or ftp sites.

Who Would Use It: Those who have an interest in designing or painting aircraft or custom static objects for FS5. For both advanced and beginning designers.

Requirements: FS5, FSFS, Windows 3.1 or WIN 95

Where to get it:
TekMate, 15307 Parkville, Houston, TX 77068 USA
On-Line Store: 713-440-7033 [8N1 to 28800 kbps]
Voice line: 713-440-5542 or 7369 (Fax)
Internet e-mail: tekmate@onramp.net
Web site: http://rampages.onramp.net/~tekmate
CompuServe: 73030,2446

Discounts: MicroWings Members qualify for discounts on single sessions and subscriptions. Ask for your **MW** discount when ordering.



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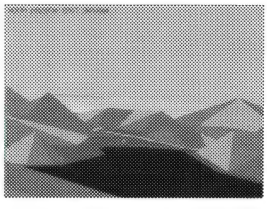

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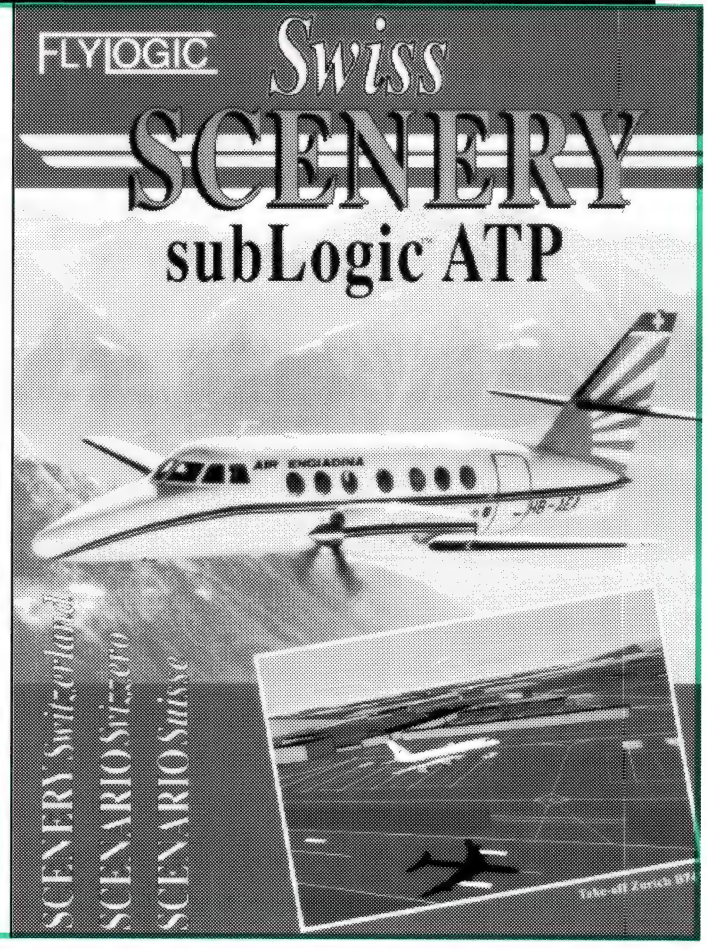


FLIGHT SCHOOL

STALL RECOVERY

Instructors will usually introduce stall recovery to the pre-solo student pilot who has developed good, basic flying skills and has demonstrated an understanding of the fundamentals of flight. Understanding the reason why an airplane will stall and how to recover is essential to every pilot. Stall practice builds confidence and an understanding of aircraft aerodynamics. The instructor's objective is to teach the student stall recognition and good recovery habits. Stall practice also gives you a good feel for the airplane at unusual airspeeds and attitudes you probably will not experience any other time during your basic training as a private pilot. When practicing stalls, remember the real objective is not to learn how to stall the airplane but to learn how to recognize the first stages of an immanent stall and take prompt corrective action to recover.

THE BASIC STALL - A stall is a condition in which the angle of attack exceeds the wing's ability to produce lift. When moved through the air, the wing, by design will produce a great deal of lift when operated within the designed limits. The wing's forward speed must be above the stall speed for any given configuration and the angle of attack such that the air can flow smoothly over it (see Figure FS.1). An airplane will climb at high angle of attack and high airspeed. It will maintain an altitude with just the right combination of power setting, speed, and angle of attack. Even with no power, prop wind-milling, and airspeed just above stall speed, the wing will still produce lift.

The angle of attack is the angle between the wing's "mean chord" and the "relative wind". The relative wind is the wind moving past the airfoil as it moves through the air. The direction of this wind is relative to the attitude of the airfoil and is always parallel to the flight path of the airplane. The velocity of the relative wind and the airspeed of the airplane are equal and opposite to each other.

The stall occurs when the angle of attack becomes too great and the air flowing over the wing starts to break away from the surface; it becomes turbulent (see Figure FS.2). The low-pressure area above the wing begins to dissipate, and with it lift. Don't forget; a stall can occur at any airspeed, in any attitude, with any power setting. Also, stall speeds change with angle of bank, configuration, and changes in gross weight (see Figure FS.3). Additionally, an airplane will stall at a higher speed with flaps retracted than with them extended. Now if you understood all of that stuff, let's talk about the wing.

THE WING - The theory of airfoils is more complicated than most training materials describe. The aeronautical engineer must consider the type of air-frame the wing is to lift. Is the aircraft a glider, single, or multi-engine? Circulation, bound vortices, mean camber, coefficient of lift, angle of incidence, aspect ratio, and wing area are just a few of the considerations that the engineer must implement into the design. Keep in mind the main purpose of the wing is to produce lift. Even though there are engines, tip tanks, landing gear, lights, and other accessories attached to the wing, as well as a large capacity fuel tank housed in each, the main purpose of the wing is to develop enough lift to become airborne, climb, and maintain altitude at our command. Wings are designed to meet the particular need of the aircraft designer or engineer. Some wings are built for speed and may be designed relatively small and swept back. Another wing may be built for high lift ability to enable the craft to land and take-off in a very short distance, sometimes know as a STOL (Short Take-off and Landing) airplane. Regardless of the design of any particular wing they all have one other thing in common. They all will stall if the pilot exceeds the wing's ability to produce lift.

The wing is a cambered airfoil. The top of the wing has more of a curve to it than the bottom portion, so the distance from the wing's leading edge to the trailing edge is greater on top than bottom. The air's velocity is greater over the top of the wing and will produce a low pressure area just above the wing's surface. A higher pressure exists on the bottom and the result of all of this is "lift". As the airspeed increases, the lift will increase. That's the theory anyway. If you hang around pilots long enough you will hear one say, "A barn door will fly given enough power." I understood what they meant the first time I saw a 747. Watching a large airplane like a 747 climbing out after take-off will give you a really good idea of the tremendous lifting ability the wing can produce. The propeller is nothing more than a twisted wing; when it turns, it produces lift. A jet engine is actually hundreds of very small propellers (fans). The faster it turns, the more lift it produces. They may call it "thrust," but it is still horizontal lift. Imagine the additional thrust and lift involved when the 747 has the "shuttle" on its back. If you have ever stood behind a propeller type airplane while the pilot applied power to pull away from the parking spot, you can appreciate just how much thrust (lift) the propeller will produce.

Airplane engineers have designed and built the safest and most dependable products in the world due to the abundance of aerodynamic information collected since the beginning of aviation. Some of this same information is used in flight simulation programs. An example is the engineer's desire to produce a wing that will stall at the tip last. That's where the ailerons are located and will help to maintain control at critically slow airspeeds.

The best stall pattern is to have the wing stall at its root first, with the stall progressing outward towards the tip. This type of wing is designed with a very slight twist to it. The difference may not be more than 2-3 degrees between the root and the tip. The tip has a lower angle of incidence (resulting in a lower angle of attack during the approach to a stall) and will still produce lift after the root section has stalled. Other devices such as slots, stall strips, airfoil varia-

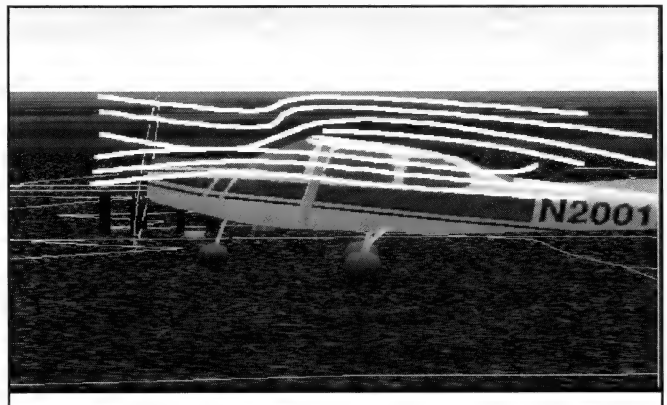


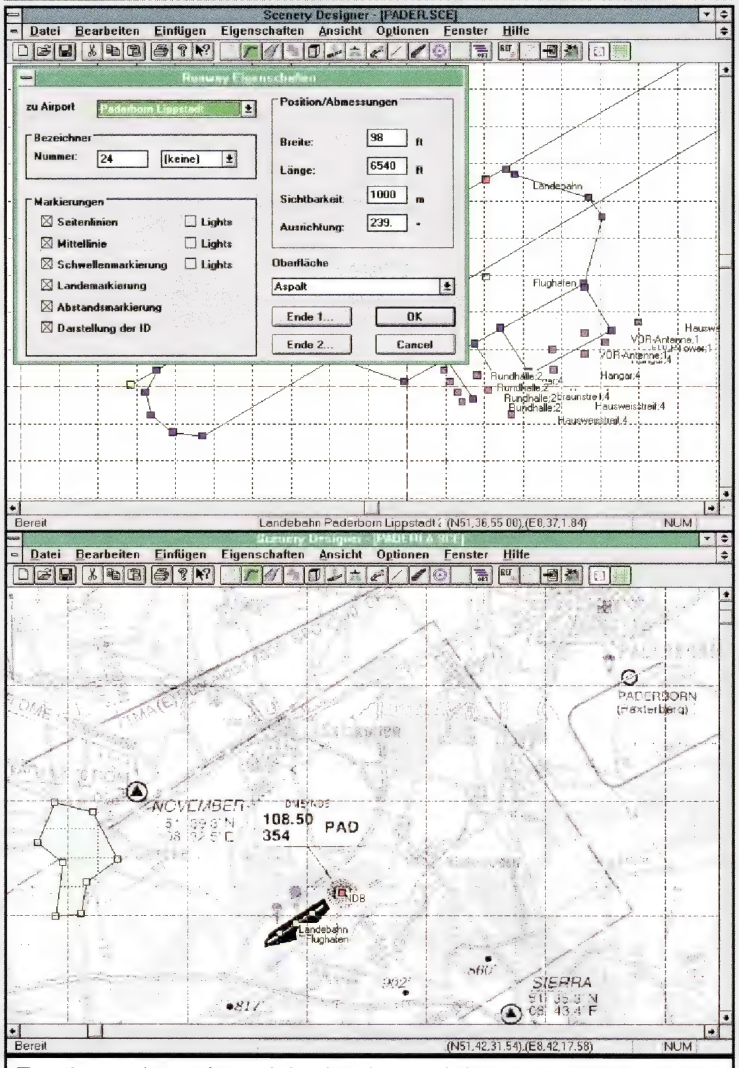
Figure FS.1 - Under normal flight conditions, the air flows smoothly over the surface of the wing.

SNEAK PEEKS

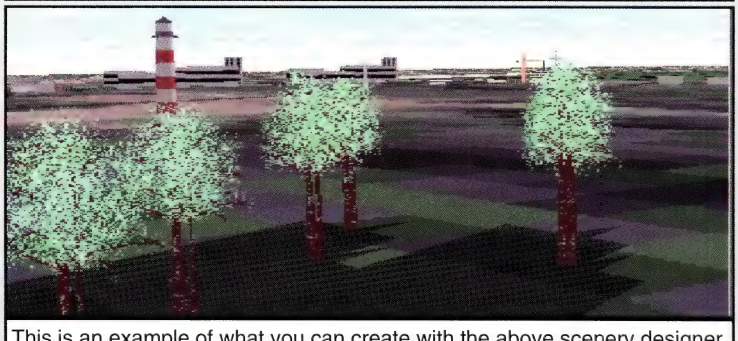
X - P L A N E

New from Laminar Research and JetStream Catalog, X-Plane is a new VFR & IFR sim for both PC and MAC. Features the entire USA including scenery based on US Geological Survey data. User define-able flight models for emulation of any plane and five different panel layouts to choose from, make this new Sim truly customizable to your liking. Below are some screen shots from a review that will be appearing in a future issue... [Laminar Research 803-738-0910 or JetStream telephone: 503-693-3522].

The Canary Islands, due out in May from Aerosoft



These 2 screen shots are from a windows based scenery designer due out in May from Aerosoft.



This is an example of what you can create with the above scenery designer.

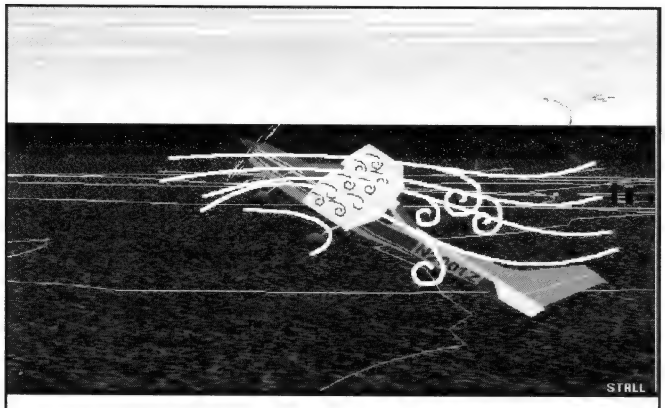


Figure FS.2 - At a high angle-of-attack, the air becomes turbulent and the wing stalls.

tions, and wing tip designs are also used to produce a more stable wing at slow airspeeds. FAA certification rules require that an airplane exhibit no unsafe rolling tendencies at the stall. So we can stall the airplane with confidence knowing the designer had stalls in mind when the plane was put to the drawing board.

Power - Off Stalls - Before getting into the airplane, try to locate and secure all loose objects. Better to do it now rather than at 2,000 ft. while recovering from an unusual attitude. Sometimes you will hear the power-off stall referred to as an "approach to landing" stall. We will be practicing power-off stalls in the same configurations as might be encountered while approaching to land at an airport so the term fits the condition. At high altitudes with proper recovery technique, stalls are perfectly safe to practice. At low altitude, close to the ground, stall recovery must be immediate and properly executed. When below 1,000 feet (AGL - Above Ground Level), it is in the pilots best interest to always be aware of the airspeed, pitch attitude ,and available altitude. Remember to fly the plane first, navigate next, communicate last, and you will probably never experience the unintentional stall.

Let's climb up to 3,000 ft. and take a heading due north. When you have the plane in straight and level flight, make a 90 degree turn to the left and then the right looking all around for other aircraft. This maneuver can also signal other aircraft that you may be about to do something unusual. This is the "clearing turn" and should be a reminder to all pilots to look before making any quick moves that another aircraft may not be expecting. While still in level flight on a heading due north, pull the carburetor heat on (if required). Decrease the power to around 1,000 rpm. Leave your right hand on the throttle as much as possible to add or reduce the power setting while practicing stalls. Hold your altitude as long as possible by increasing the pitch attitude. The airspeed will decrease until a horn, buzzer, light, or a combination of these warning devices will activate about 7-10 knots before the actual stall. Use every cue possible to recognize the stages of the stall. Visually you can see the airplane at an unusually high pitch attitude and the red light glowing on the dash. You can hear the stall horn, the lack of wind noise, and at times the airplane rattle as it struggles to fly. The control pressures will become less effective and you may even feel the airplane begin to sink. The instrument panel is probably screaming "stall" with the attitude indicator showing a high pitch attitude, the altimeter beginning to decrease, the vertical speed indicating a descent, and the airspeed indicator at the bottom of the green arc. For right now you may want to try concentrating on everything else to recognize the stall and come back to instrument stalls later in your training (see Figure FS.4).

STALL SPEEDS - POWER OFF CONDITIONS gross wt-2500 lbs. speeds are mph, cas	0 degs.	20 degs.	40 degs.	60 degs.
FLAPS UP	63	65	72	89
FLAPS 15 degs.	58	60	67	83
FLAPS 30 degs.	53	55	60	75

Figure FS.3 - Stall speed increases with an increase in angle-of-bank, decreases with flaps extended.

At the first buffet of a stall we will lower the nose just below the horizon. Apply full power and turn the carburetor heat off. Raise the nose back to straight and level flight and adjust power. Begin climbing back up to 3,000 ft. for more of the same. Try recovering from a stall without applying power several times just to get the feel for the airplane and what the wing is going through during the stall and recovery stages. Remember to lower the nose first and break the stall before adding full power. If you were to add full power just as the stall occurred without decreasing the pitch attitude you may have something to talk about when you get back to the airport. We'll talk about torque rolls and spins later. Also remember to increase the throttle at a moderate rate. Some engines will simply die if the throttle is increased too quickly. Whether increasing power to climb, go-around, or to recover from a stall, don't get in too much of a hurry. With study and practice you will become methodically efficient at stall recovery and won't panic under stress. Pushing forward on the yoke excessively during the recovery will result in a negative-g force, sometimes launching objects we over-looked before take-off, within the cabin. Most stomachs are limited to the number of negative-g's it can experience before it will be warning you to return to the airport as soon as practical. After you have decreased the pitch attitude, try not to pull back too much on the elevator until the airplane has regained sufficient flying speed during the recovery, or you may experience a "secondary stall." Recovery should be prompt and proper, not rushed and clumsy. Practice...

Power - On Stalls - Now turn left, back to a heading due south. The power-on stall is also called the "take-off and departure." The goal is to prevent a stall while low and slow, at a high power setting, just as you might be during the take-off and climb-out phase from the airport. On a heading of 180 degrees, climb using about 85% power. Smaller airplanes might practice full power stalls, but large engines may over-power some airplanes in a full-power stall. The ailerons may not be effective enough at slow airspeeds to counter the engine's torque. A torque roll may occur if the power is too great and the airspeed too low. So let's use about an 80-90% power setting until some other day when we feel the need for a little more excitement. With the proper training and an airplane certified for "spins", a torque roll - spin and recovery would be fun. At the first buffet of the stall we will lower the nose (pitch attitude), add full power, and level off. Power-on stalls are not all that exciting when properly executed. Maintaining your heading throughout the stall is a challenge in itself. A constant right rudder may be necessary to counter the torque, p-factor, and slip stream. The stall speed will be less with power on and the controls less effective due to the slower speed and higher pitch attitude. Recovery will be more rapid because of additional thrust being applied while simultaneously lowering the pitch attitude. If one wing begins to drop as the airplane stalls, immediate application of coordinated rudder and aileron will be needed to level the wings.

Accelerated Maneuver Stalls - The pilot

Figure FS.4 - Low airspeed, pitch high attitude, vertical speed increasing, and lift decreasing are all indications of a possible stall. At the first indication of a stall, lower the nose just below the horizon.

was diving towards the ground at a very steep angle. The airspeed indicator was just above the "never exceed" speed when he decides it's time to pull up. Hoping the wings don't depart from the aircraft, he pulls back on the stick hard, increasing the pitch attitude beyond the wing's ability to provide lift and stalls the wing. The airplane is now at a high sink rate at high speed and may not change until the pilot lowers the nose and allows the wing to function as it was intended. This is an example of an accelerated stall. Try this particular diving maneuver at home on your simulator only. From a high-speed dive, apply full elevator and look for the stall warning indicator to come on (see Figure FS.5). During our flight training we will limit the accelerated stall to a steep turn or shallow dive. This is also a good time for you to see and feel a stall at a higher than "normal" airspeed.

From a shallow dive at about 20 knots above the unaccelerated stall speed, pull back abruptly enough to hear or see the stall warning indicator come on. Don't continue to hold back pressure more than a few seconds or you may be doing another power-on stall, loop, or other unintentional maneuver. Never exceed the maneuvering speed while practicing accelerated stalls. "Maneuvering speed" is the maximum speed at which full, abrupt, control travel at gross weight may be applied without exceeding the airplane's load limits. This speed is usually found in the airplane's owners manual and is important when you are flying in severe turbulence. Let's do one more accelerated stall by banking the airplane 60 degrees to the left at cruise airspeed, (stay below the maneuvering speed), maintaining altitude, and applying just enough back pressure until the wing stalls. Reduce the power setting if necessary. At the first indication of the stall, reduce the angle of attack, add full power and level the wings in a smooth, simultaneous move. Now practice one to the right.

Figure FS.5 - Notice the high airspeed, pitch attitude indicator, RPM's, and the STALL indicator... in this accelerated stall simulation.

Accelerated maneuver stalls should not be performed in any airplane that prohibits such maneuvers by its type-certification restrictions. Always check the "owners' manual" for limitations before assuming an airplane can be rolled, looped, placed in a spin, or even intentionally stalled.

Post Flight - What would be the result if a pilot did not recover from a full stall? Probably loss of altitude in some form or another. The pilot may find the airplane in a spin straight towards the ground. Proper recovery technique and available altitude make spins as safe as stalls to practice. Always consult the owner's manual before conducting spins. You may not ever practice spins during your initial training but your instructor will make sure you understand the proper recovery technique.

Just how proficient do you need to be at stalls? As a private pilot you should be able to explain the stages of a stall; conditions leading up to a stall; and the proper recovery technique. You will be able to demonstrate a stall and recovery from any configuration required by the examiner. You will need to maintain a specific heading +/-10 degrees if in straight flight; a specified bank within +/- 10 degrees not to exceed 30 degrees if in a turning stall. Stalls should be practiced in all configurations. Practice stalls with various flap settings, gear up/down, from shallow banks to 30 degree banks, with and without power.

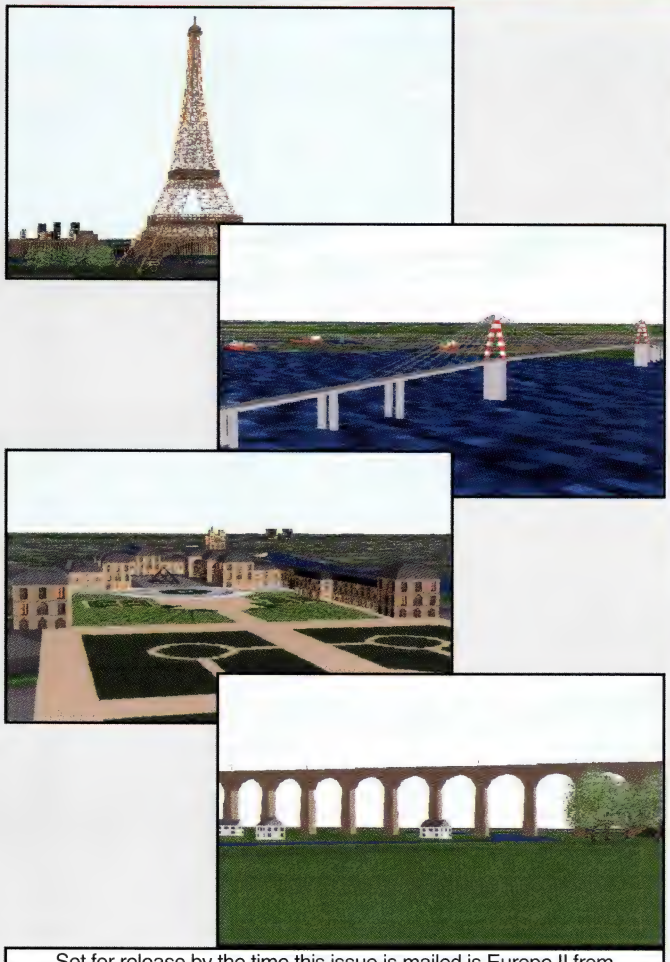
Some of the other factors that effect stalls are the loading of the airplane, density altitude, and the wind gust. Try to imagine what might happen if you had a very heavy load tied down towards the rear of your plane and while attempting to land you got just a little too slow and stalled on approach. You may not be able to decrease the angle of attack due to the tail heavy load.

Practice stalls on your simulator just as systematically as you would flying the actual airplane. The simulation is remarkably realistic and how ever the plane reacts on the simulator, will be very close to what you will experience in the real thing. Simulate a view from which you can observe the airplane's reaction to a full stall. While holding full back pressure and the wings as level as possible using the ailerons and rudder, see if the plane will drop its nose at the stall, build up air-speed, and climb right back into another stall. Just to see what will happen, don't release the back pressure during this maneuver. Now go try it in the real thing. You may find the airplane will respond the same in both situations.

Your ultimate goal is to never stall the airplane unintentionally. If it does happen, you should automatically react without thinking about what your doing. Set a goal during each practice to recover with less altitude lost and a more efficient recovery technique than the last time. Think about this; after a two hour cross-country in windy conditions, you're tired, hot, and hungry. While on final approach all you can think about is getting the plane on the ground, tie it down, use the facilities, and get home. You've just crossed the runway thresh-hold and have begun to flare out for the landing. A gust of wind lifts you 20 feet in the air, the horn starts to sound. Your pitch attitude increases rapidly, the nose is blocking the runway below from your sight, and the airspeed diminishes to a stall.... what will you do?

About the author - Bob Pursur has been flying in the Dallas, Texas area since 1973.He has been a CFI since 1977 and has been flying computer simulators since 1980. He is a Systems Tech. with Southwestern Bell Telephone and flys out of the Lancaster and Addison airports. He can be reached via Internet email at [ursa@airmail.net]. [MW✈]

SNEAK PEEKS



Set for release by the time this issue is mailed is Europe II from Apollo Software covering Belgium, Luxembourg, France, and the island of Corsica.

FSWG Madrid (Spain), the follow-on to Pilot's spectacular first hit called Hong Kong, is due to be released sometime in the 2nd quarter of this year.

The stunning shots shown here and on the cover, are from Sierra's first all-new general aviation simulation due out in November. It will be called "Pro Pilot" and, if the software lives up to the expectations oozing from these screen captures, it should be spectacular! The cover is a Cessna Citation Jet heading south from San Francisco. To the left is a Bonanza heading over a mountain. On the right is a Cessna 172 heading towards San Francisco with the Golden Gate Bridge in the foreground.

UNDER THE HOOD

Flying On Instruments

with Jonathan Stern

FRIENDS OF MEIGS

The February 1996 edition of *Flying* Magazine contained an article quite typical of our times: it discussed the looming closure of another of the United States' general aviation airports. What was atypical about the article, however, was its discussion of the interplay between the real world and the world of flight simulation.

The article, *Fight Brews Over Closure of Meigs Field,* points out that the City of Chicago plans to close Meigs Field sometime in 1996 but that resistance to the planned closure is coming from "unexpected quarters: computer gaming enthusiasts in the U.S. and abroad."

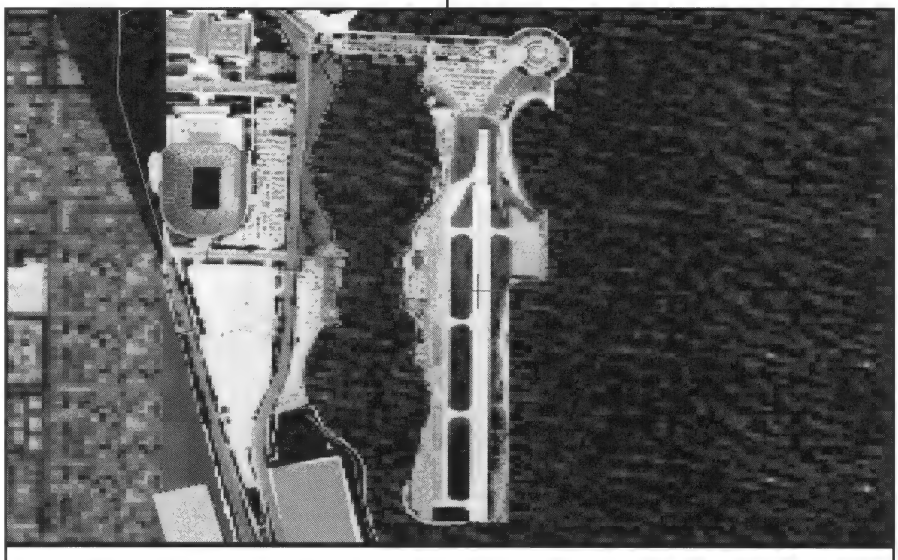


Figure UTH.1 - Our beloved Meigs Field, Chicago, Illinois.

The article suggests that Meigs Field is "arguably the world's most recognizable airport" because it is the "home airport" for Microsoft's *Flight Simulator*. "While few of these new friends of Meigs have ever laid eyes on the real-world Meigs," the article concludes, "they hold the field in high esteem." Anyone interested in helping *Friends of Meigs* is asked to contact the organization at (312) 465-0388 by telephone or (708) 966-6168 by fax.

As a show of support for *Friends of Meigs*, this *Under The Hood* column contains a flight departing from Meigs Field. The trip is supported with either the CD version of *Flight Simulator* or John Trindle's Instrument Scenery Set and can be flown with or without *Flight Simulator Flight Shop*.

MEIGS TO MILWAUKEE

The flight is from Meigs to Milwaukee's Mitchell Field. This is a very short trip (70 nautical miles) suitable for virtually any airplane in the current *Flight Simulator* stable. I still favor Kerry Gipe's G-IV SP with Hardy Heinlin's Boeing 727 panel. With a fix provided by Juan Cabeza, we now have the autopilot indicators/controls on the panel. This trip is easy to program; it has only a single waypoint. Although the adventure begins with the airplane on Runway 36 at Meigs, I was instructed to taxi to Runway 18. The only problem that I experienced is that the enroute portion of the second and last leg is almost aligned with the final approach course to the runway that was in use. In that situation, *ATC* gives no advance information on the approach, and I was cleared for the approach when my airplane was right on top of the outer marker. I barely had time to hit the autopilot disconnect switch and push the nose over to start down the glideslope.

I consider it part of my job to flight test my articles before I submit them for publication. In keeping with this philosophy, I uploaded the trip to FSS a second time. This time the compiled adventure differed insofar as I was instructed to use runway 36 for takeoff from Meigs, and the approach in use at Milwaukee was the ILS Rwy 19R IAP. *ATC* vectored me to a point on the localizer course outbound and instructed that I fly the procedure turn. That worked just fine and led to an uneventful landing.

One need only look in the *ATC Workshop* database, however, to see that Milwaukee offers several more possibilities for ILS approaches. If I recompiled the adventure enough times to experience them all before I provided my article to *MicroWINGS*, I would never meet the submission deadline (or, alternatively, I'd never get to my day job to make a living).

The route of flight for our trip is from CGX (Meigs Field) to the Northbrook VORTAC (OBK) to Mitchell Field (MKE). If you're using *Flight Shop*, program the route of flight in *ATC Workshop* and upload it to Flight Service. I almost always select "significant" weather so that the flight is more challenging. If, however, you are less experienced at instrument flying or wish to do some sightseeing along the way, you may wish to select a different weather setting.

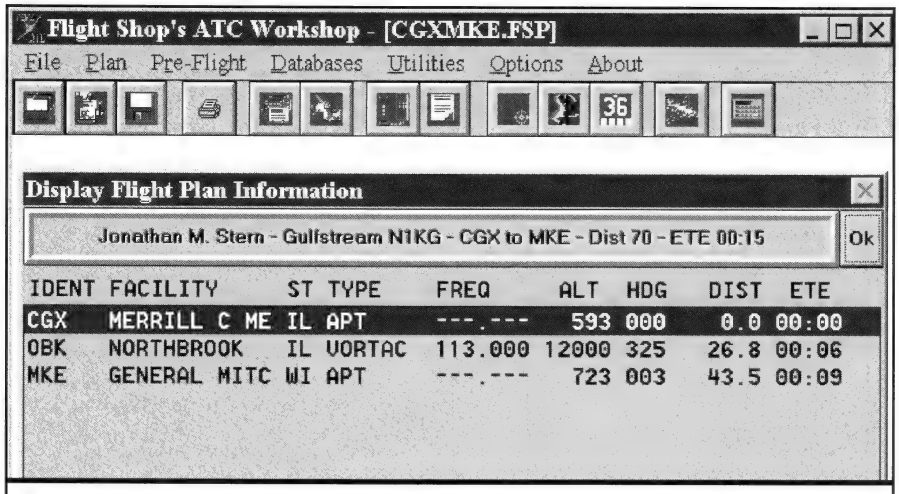

Flight Shop's ATC Workshop - [CGXMKE.FSP]
File Plan Pre-Flight Databases Utilities Options About
Display Flight Plan Information
Jonathan M. Stern - Gulfstream N1KG - CGX to MKE - Dist 70 - ETE 00:15
Ok
IDENT FACILITY ST TYPE FREQ ALT HDG DIST ETE
CGX MERRILL C ME IL APT ---.--- 593 000 0.0 00:00
OBK NORTHBROOK IL VORTAC 113.000 12000 325 26.8 00:06
MKE GENERAL MITC WI APT ---.--- 723 003 43.5 00:09

Figure UTH.2 - Our flight plan from Meigs to Milwaukee.

For me, the trip began with instructions to taxi to Runway 18. Meigs is one of the few airports — if not the only one — with taxiway centerlines, and I made a left turn on the first available taxiway and followed the yellow centerline to the North end of the field. The clearance I picked up from clearance delivery was as follows: Gulfstream N1KG is cleared as filed, climb and maintain four thousand, expect twelve thousand ten minutes after departure, departure frequency one one eight point five five, squawk six four seven four.

While taxiing to the other end of the airport, I entered the transponder code, checked my instruments, and prepared the avionics for the short flight. I programmed the NAV 2 radio to Northbrook on frequency 113.0 so that the ILS at Milwaukee could be programmed into the NAV 1. The runway length at Meigs is somewhat less than marginal for a G-IV, and I improved my odds of making a successful (and dry) takeoff by off-loading 75% of my fuel during taxi-out.

As I arrived at Runway 18, I tuned the Tower on frequency 122.85, and advised that I was ready for departure. The Tower controller instructed that I fly runway heading and cleared me for takeoff. I set the flaps for takeoff, taxied onto the center of the runway, and advanced the throttles for takeoff. With my light fuel load, the Gulfstream accelerated rapidly down the runway and in quick succession passed through V_1 and V_R. I pulled back gently on the yoke and rotated to a pitch attitude of eighteen degrees. As the airplane began its ascent, I raised the landing gear after confirming on the VSI (Vertical Situation Indicator) a positive rate of climb.

After crossing the airport boundary, the Tower instructed me to climb to 4,000 feet, turn right to a 330° heading, and contact departure. Departure told me to standby and then climbed me to 12,000 and switched me to Chicago Center.

The Center controller cleared me direct to Northbrook at 12,000 feet. This is a short leg and requires standard VOR tracking procedures. As I neared Northbrook, Center instructed me to fly a 360° heading and fly direct to Milwaukee. As I have said before, this instruction is ambiguous, because I do not know whether I am to use my own navigation or fly an assigned heading. In any case, the Center descended me to 3,000 feet and asked me to contact Milwaukee Approach Control.

As I indicated above, I did not receive any advance information on the approach in use. All of a sudden, just as I was about to pass the outer marker for Runway 1L, I was cleared for the ILS Rwy 1L approach. In order to not get further behind, I paused *Flight Simulator* while I tuned the localizer frequency into the NAV 1 radio and the LOM frequency into the ADF. Then, I un-paused, retarded the throttles, and descended onto the glideslope. I switched to, and contacted, the Tower and received landing clearance. Despite the manner in which my approach began, I managed to make a decent landing (at least by the standard that any landing you walk away from is a good one) and completed my adventure.

Figure UTH.3 - The Heinlin/Cabeza 1st Officer's panel - My favorite.

About the author - Jonathan Stern is counsel with Dombroff & Gilmore, P.C. in Washington, D.C.. He holds commercial pilot, flight instructor, ground instructor, and control tower operator certificates from the FAA. He is also the author of two books on Flight Simulator: Microsoft Flight Simulator Handbook (Macmillan 1995) and Flying On Instruments With Flight Simulator (Compute! Books 1987). Jonathan can be reached on CompuServe at ID 73502,2437. [MW✈]

Review of...

Microsoft's World Of Flight

Need a decent reference guide to the fascinating world of aviation? Then look no further because Microsoft's World of Flight is as entertaining as it is educational. This multimedia exploration of aviation past and present is an impressive piece of work. Using more than 700 interactive articles, hundreds of pictures, over a thousand audio clips, and dozens of video footage, this CD- ROM packs a lot into one disc.

So lets "explore" and see what is there. First, what you see on the box is a flavor of what is inside. System requirements for using "World of Flight" are clearly stated: 486 multimedia PC, 8MB memory, an SVGA monitor, and Windows v3.1+ or Win95. It works just as well in Windows 3.11 as it does in Win95. I appreciate products that do not force me to upgrade my operating system just to enjoy them, long may it continue! One thing I love about this product is that a sense of humour is evident; the minute you open the box, you will find a "Paper Airplane" with instructions on how to fold and "trim" it, a little something for the big child in all of us. Loading the program is simple and straight forward and if you have any other MS Multimedia programs (Encarta 96 for example) it will load in under the Multimedia icon. This is a neat idea and for those of you with Win95 it has the Autorun feature.

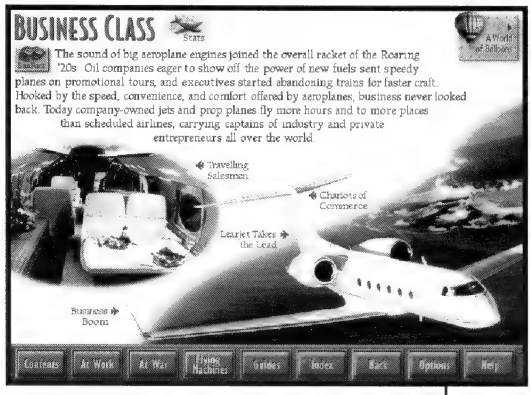
Always view the readme file as it contains usually important or late breaking information. The opening screen clearly lays out the way the program is divided. Five metal plates have the five main sections inscribed on them. They are as follows: **At War**, **Flying Machines**, **Guides**, **At Work,** and the **Index**. The tool bar at the bottom of the screen contains buttons for the five main sections and also Options, Back, and Help. The Contents button is the opening screen. Leave on the opening screen for a few minutes and enjoy the screen savers included with the product. These screen savers also work with MS Scenes version 2. The Help and Back features are self explanatory but the Options button allows you to select screen savers, randomly move around the program, trouble shooting information, audio/visual choice, and my favourite - the picture gallery (around 40 stunning pictures of aircraft, balloons, and personalities).

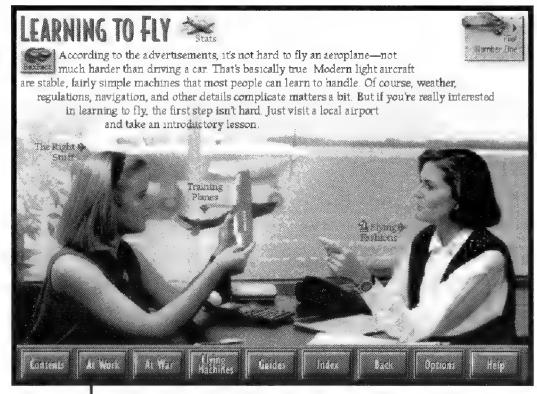
Guides

This section provides, as the title suggests, guided tours of the World of Flight. This is the best way to get a good introduction to the product. Each guide gives a good presentation of their speciality and I recommend using this well thought out method of exploring the World of Flight. Choose from the following people to show you around: Donald the airline pilot, Henry the aviation pioneer, Sam the mechanic, Bob the air traffic controller, Laura the flight instructor, Jennie the flight attendant, Jake the fighter pilot, and Carol the engineer. The animated characters are well drawn, colorful, and their sounds are easy on the ear. This is a clever and delightful way to trip through any program of this nature. I enjoyed each tour and I am sure you will.

At War

As you can surmise, this deals with the military aspects of aviation. From World War 1 to The Gulf war, the story of military aviation is covered in good detail. Many heroic and imaginative pilots are here as well as the planes that made them famous. Technical specifications of most aircraft are given. If a little red plane with "Stats" is present, clicking on it will make it do a loop and statistical information regarding the aircraft under review will be presented. When a Spanner is present, move it over a shaded-out area of the plane and watch the covers being ripped off, to metal crunching noise and clatter. The "Stats" and "Spanner" tools apply to all sections of the program. The technology of many civil aircraft starts with the military and this area of "Flight" shows the ingenuity of engineers in overcoming the limits of speed and safety in modern jet fighters. A great video clip to watch for here are the effects of G force on a pilot and to access this video you must pass a little test! Match famous WW1 Aces with their Aircraft and your reward is a video of the effect of heavy G forces on a fighter pilot. A scene from the movie "The Bridges of Toko-Ri" and another showing a Phantom evading a SAM attack during the Vietnam war are interesting to view, for they demonstrate a fighter plane's maneuverability and agility. However if "Bax Facts" is present on the screen, click and hear famous aviation writer Gordon Baxtor adding some snippet to bring you down to earth. Bax comes out with some real gems from time to time such as comparing the hot air in Balloons to what often comes out of


BUSINESS CLASS
Stats
A World of Balloons
The sound of big aeroplane engines joined the overall racket of the Roaring '20s. Oil companies eager to show off the power of new fuels sent speedy planes on promotional tours, and executives started abandoning trains for faster craft. Hooked by the speed, convenience, and comfort offered by aeroplanes, business never looked back. Today company-owned jets and prop planes fly more hours and to more places than scheduled airlines, carrying captains of industry and private entrepreneurs all over the world.
Travelling Salesmen
Chariots of Commerce
Learjet Takes the Lead
Business Boom
Contents
At Work
At War
Flying Machines
Guides
Index
Back
Options
Help


LEARNING TO FLY
Stats
Top Number One
According to the advertisements, it's not hard to fly an aeroplane—not much harder than driving a car. That's basically true. Modern light aircraft are stable, fairly simple machines that most people can learn to handle. Of course, weather, regulations, navigation, and other details complicate matters a bit. But if you're really interested in learning to fly, the first step isn't hard. Just visit a local airport and take an introductory lesson.
The Right Stuff
Training Planes
Flying Fashions
Contents
At Work
At War
Flying Machines
Guides
Index
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Options
Help

the mouths of politicians or while I was watching Chuck Yeager, he adds that the Wright Brothers had lived to see man break the sound barrier, imagine that! From the Sopwith Camel to Stealth, all military aircraft are well documented and aficionados of military aviation will be well satisfied with this section of World of Flight.

Flying Machines

Dealing with the technology and the history of aviation, this section is split into four groups: Great Planes, How it Works, Taking Wing, and Dreams of Flight. Further subdivision uses such lovely titles as: Resting Places, Weird and Wonderful, Flights of Fancy, Ultimate Ultralights, Chopped up Chopper, Milestones of Flight, X15-Xray, Do it Yourself, and many more. Naturally the aforementioned titles are fairly descriptive about what is going on here.

The raft of information on civil and to some degree military aviation covered in this section is mind blowing. How engines work to descriptions of famous home-built aircraft is of particular interest to this writer. Oshkosh is given a good mention, I would dearly love to go there some day and marvel at kit-planes like the Glassair and Lancair. Visit the cockpit of the Boeing 757 and have a look at a 757 dragging its tail on takeoff or the wheel brakes on a 747 after a heavy landing glowing red hot under the strain but not going on fire. One can only marvel at these feats of technology.

Air Traffic Control is looked at, as well as an interactive animation on the effect of pitch and yaw. Pilot training, the weather, parachuting (how anybody can jump from a plane or a skyscraper is beyond me!), balloons and airships, sailplanes, and helicopters are all given a fair airing. Under Giants and Gnats I learned of a six-engine monster called the Tupolov ANT-20, a flying hotel! In the Pilot subheading, take a peek at the video about ejecting from a jet fighter or at the pilot who, in the early days of flying, was not wearing a seat belt and fell out of an open cockpit during a loop! The video footage on the JAL 747 training school at Moses Lake, Seattle gives a decent insight into the right-stuff for flying the venerable giant and, for some light relief, look at the two guys playing tennis atop a biplane in the wing walker's section.

For those of you with Flight Unlimited check out Patty Wagstaff doing her thing with an Extra 300. This lady can really put a plane and my nerves if I were with her, through their paces. Her aerobatic skills are truly amazing and small wonder that she is an aerobatic champion. In the airshow section watch the Blue Angels in very tight formation or the distinctive nine plane trademark of the RAF's Red Arrows. The continuing development of wide bodied planes is captured under the Great Planes heading. Airbus's A340 is shown in flight as are the glass cockpit and fly by wire principles that are becoming the norm on today's passenger aircraft.

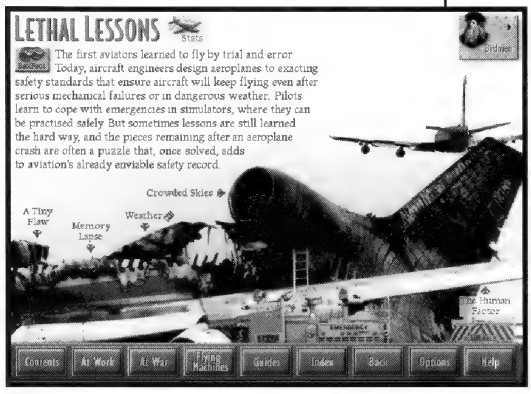
Helicopters like the Bell Jet-ranger and the Sikorsky S-55 are given as much pride of place as other modes of flight. From Da Vinci's early musings to Choppers servicing the oil rigs in the inhospitable environment of Scotland's North Sea, the subject of rotary aircraft is informative. Helicopters have played a versatile role in wartime and in peacetime and their ability to ferry people to hospitals after major accidents is immeasurable.

Index

The index provided with World of Flight must be the best I have ever seen. Not only is it alphabetical, but it is also graphical. This index is idiot proof. On the top right-hand corner you can choose between an article only index or an aircraft only index. Having this kind of choice is worthwhile as it saves wading through articles to find a particular type of plane. User friendly would be an understatement to describe this feature.

MS World of Flight is as it says: "An exploration of the history, people, and the technology of aviation". This product has already won a gold star from the French Department of Education, and no doubt will win many more and deservedly so. I was enthralled by it from the moment I received it and I cannot recommend it enough. So take my advice, go and treat yourselves!

About the author - John McNeely is a service engineer living near Dublin, Ireland. He is a flight simulation enthusiast, participating in the local PC Pilots Of Ireland flight sim club and is a frequent contributor to PC Live Magazine. [MW✈]


LETHAL LESSONS
Stats
Evidence
The first aviators learned to fly by trial and error. Today, aircraft engineers design aeroplanes to exacting safety standards that ensure aircraft will keep flying even after serious mechanical failures or in dangerous weather. Pilots learn to cope with emergencies in simulators, where they can be practised safely. But sometimes lessons are still learned the hard way, and the pieces remaining after an aeroplane crash are often a puzzle that, once solved, adds to aviation's already enviable safety record.
Crowded Skies
A Tiny Flaw
Memory Lapse
Weather
The Human Factor
Contents
At Work
At War
Flying Machines
Guides
Index
Back
Options
Help

TO THE RESCUE
Stats
Flying Fortress
The same qualities that make aircraft awesome weapons—speed, ability to fly over obstacles and to carry large loads—also make them ideal for rescues after natural disasters, in hostile terrain, and when immediate assistance is necessary. Today all around the world, aircraft like the mammoth Lockheed C-5 Galaxy are as likely to carry food and medicine to refugees as to transport tanks and ammunition to an army.
Covering Angels
Air Ambulances
Contents
At Work
At War
Flying Machines
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Index
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Options
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FLIGHT SIM CENTRAL

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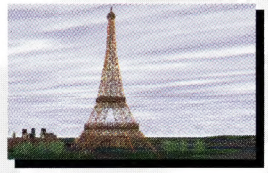

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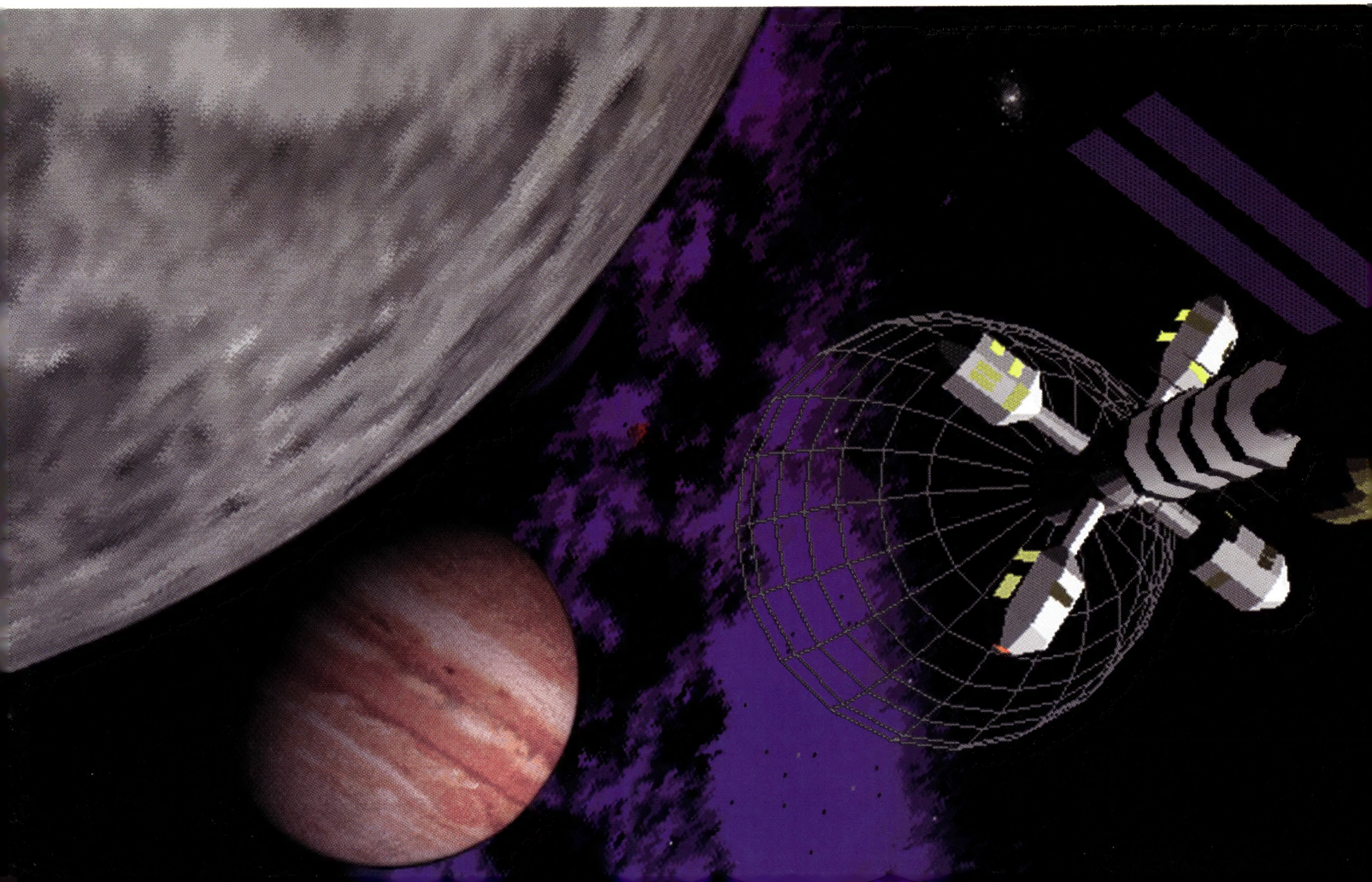

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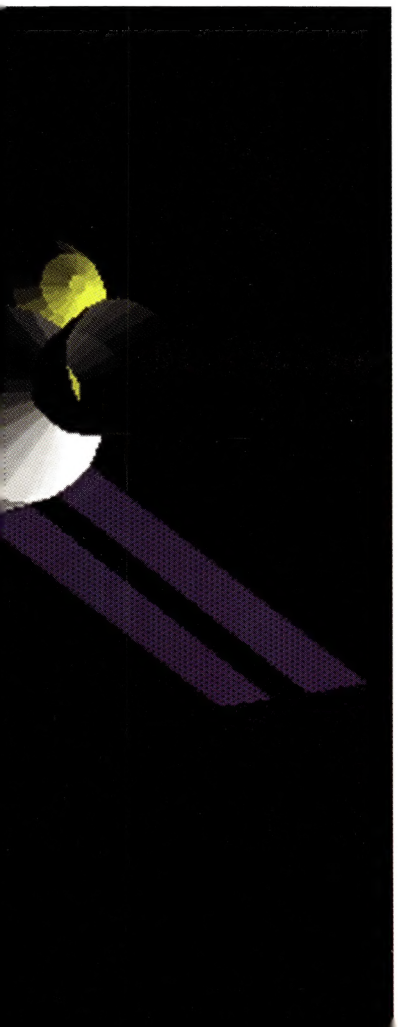

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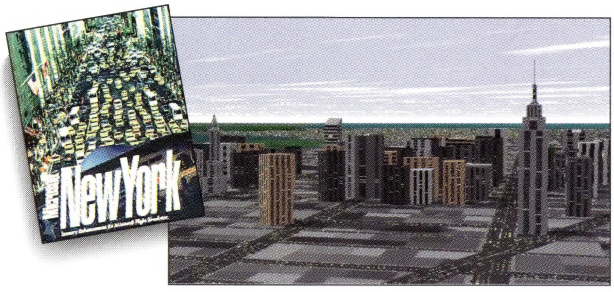

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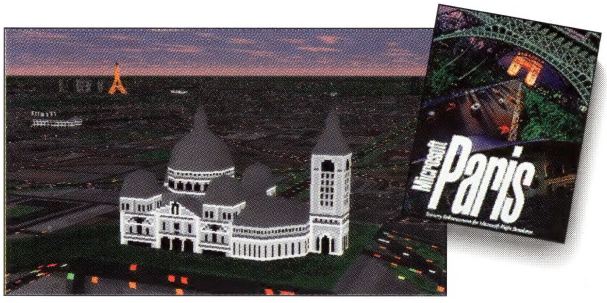

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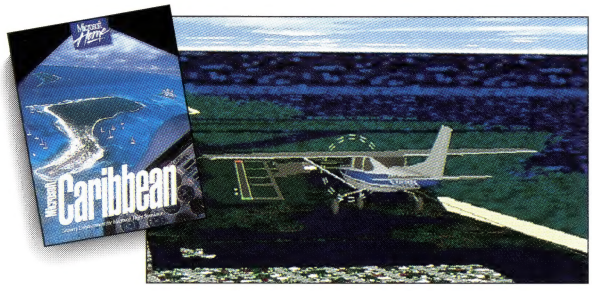

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